

MAINTENANCE

SECTION MA

MA

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BASIC MECHANICAL SYSTEM

RETIGHTENING CYLINDER HEAD BOLTS, MANIFOLD NUTS AND VENTURI NUTS

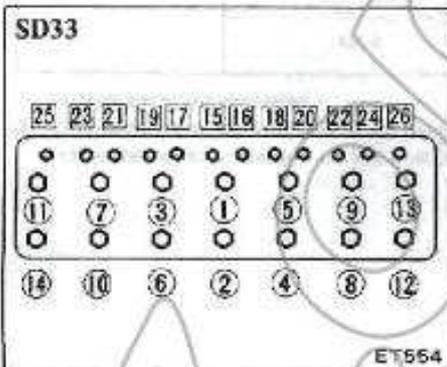
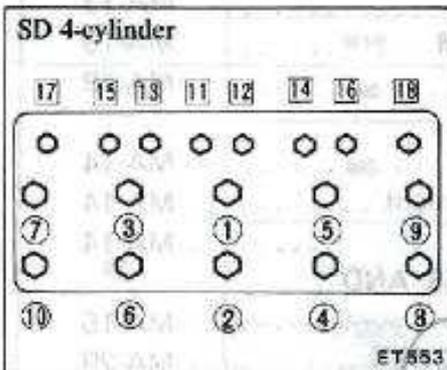
CYLINDER HEAD BOLTS

1. Run engine until coolant temperature indicator points to the middle of gauge, then stop engine.
2. Remove valve rocker cover.
3. Tighten cylinder head bolts according to the order shown in the figure, starting with the center and moving toward the ends.

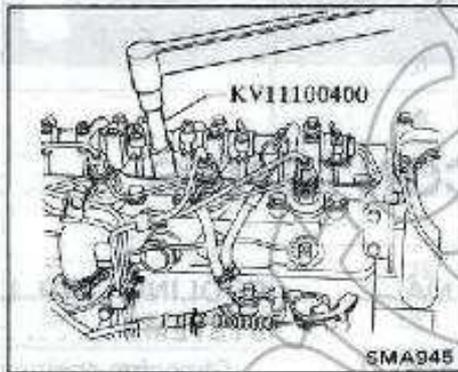
⊕ : Cylinder head bolts

Main bolts (○):
 118 - 127 N·m
 (12 - 13 kg·m,
 87 - 94 ft·lb)

Sub bolts (□):
 44 - 54 N·m
 (4.5 - 5.5 kg·m,
 33 - 40 ft·lb)



When tightening main bolts (near the rocker shaft side), be sure to use Tool.



4. Install valve rocker cover.

MANIFOLD AND EXHAUST TUBE NUTS

WARNING:

Do not check the exhaust system until it has cooled off. Otherwise, you may burn yourself.

⊕ : Intake & Exhaust manifold nuts

15 - 18 N·m
 (1.5 - 1.8 kg·m,
 11 - 13 ft·lb)

For the exhaust tube nuts' tightening torque specifications, refer to Section EF of the applicable Service Manual.

VENTURI NUTS

Leaks at this area may cause rough idle, surging, deceleration, popping or whistle.

⊕ : Venturi nuts

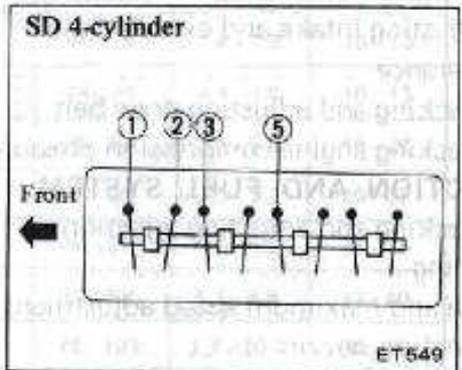
3 - 4 N·m
 (0.3 - 0.4 kg·m,
 2.2 - 2.9 ft·lb)

ADJUSTING INTAKE AND EXHAUST VALVE CLEARANCE

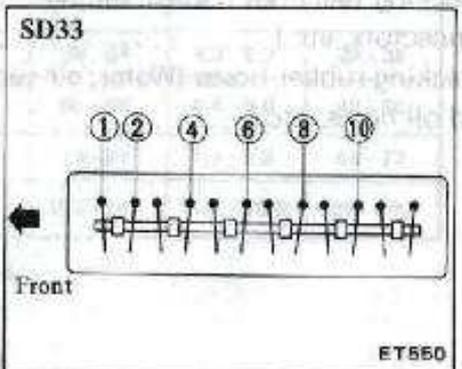
- a. Adjustment should be made while engine is hot.
- b. Adjustment cannot be made while engine is in operation.

To adjust, proceed as follows:

1. Remove valve rocker cover.
2. Set No. 1 piston to Top Dead Center on compression stroke.
3. Adjust clearances of ①, ②, ③ and ⑤ valves.



Adjust clearances of valves ①, ②, ④, ⑥, ⑧ and ⑩.



Valve clearance (Hot):

Intake

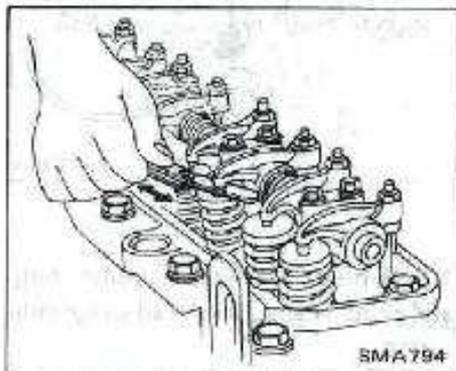
SD 4-cylinder - ② ③
 SD33 - ② ⑥ ⑩
 0.35 mm (0.014 in)

Exhaust

SD 4-cylinder - ① ⑤
 SD33 - ① ④ ⑧
 0.35 mm (0.014 in)

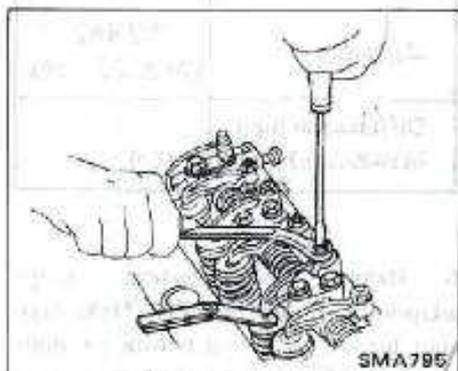
(1) Using feeler gauge, measure clearance between rocker arm and valve head.

Feeler gauge should move with a very slight drag.



(2) If clearance is not the specified value, loosen rocker arm nut and turn rocker arm screw to provide proper clearance.

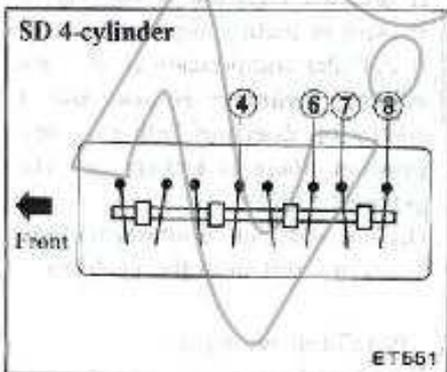
(3) Hold rocker arm screw and tighten rocker arm nut.



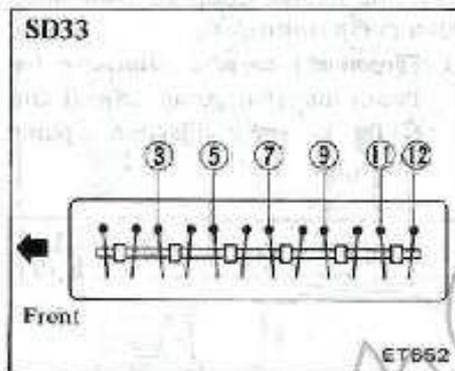
(4) Recheck clearance.

4. Bring No. 4 piston (SD 4-cylinder) or No. 6 piston (SD33) to Top Dead Center on compression stroke.

5. Adjust clearances of ④, ⑥, ⑦ and ⑧ valves.



Adjust clearances of valves ③, ⑤, ⑦, ⑨, ⑪ and ⑫.



Valve clearance (Hot):

Intake

SD 4-cylinder - ⑥, ⑦

SD33 - ③, ⑦, ⑪

0.35 mm (0.014 in)

Exhaust

SD 4-cylinder - ④, ⑧

SD33 - ⑤, ⑨, ⑫

0.35 mm (0.014 in)

6. Install valve rocker cover.

CHECKING AND ADJUSTING DRIVE BELT

1. Visually inspect for cracks or damage.

The belts should not touch the bottom of the pulley groove.

2. Check belt tension by pushing.

The belts should deflect by the specified amount.

Drive belt deflection:

8 - 12 mm

(0.31 - 0.47 in)

Applied pressing force:

98 N (10 kg, 22 lb)

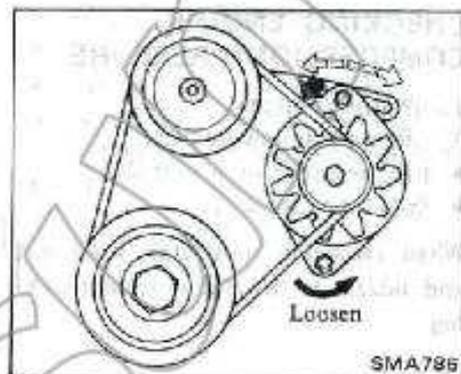
3. Adjust belt tension as follows:

FAN BELT

1. Loosen upper and lower alternator securing bolts until alternator can be moved slightly.

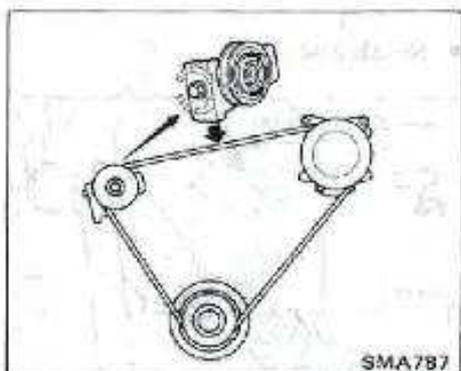
2. Move alternator with a prying bar until belt tension is within the specified range.

Then tighten bolts securely.



AIR CONDITIONER COMPRESSOR BELT

1. Loosen idler pulley lock nut.
2. Turn idler pulley adjusting bolt in either direction until air conditioner compressor belts' tension is within the specified range.



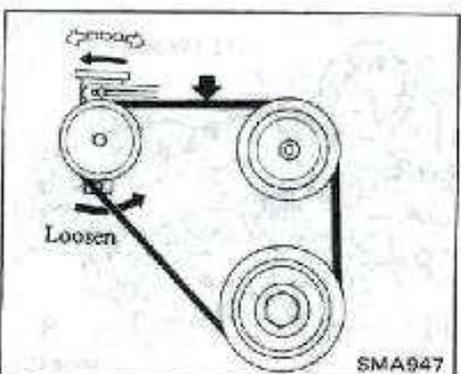
3. Tighten idler pulley lock nut.

POWER STEERING PUMP BELT

1. Loosen pump fixing bolt and adjusting bar bolt.

2. Move pump until fan belt tension is within the specified range.

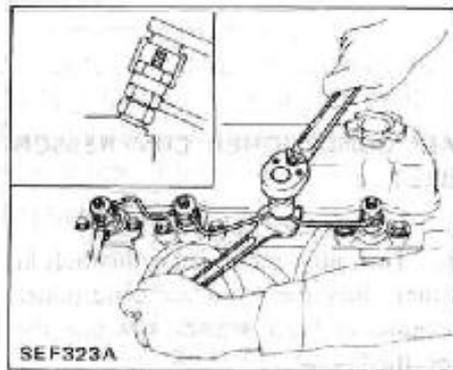
Then tighten pump fixing bolt and adjusting bar bolt.



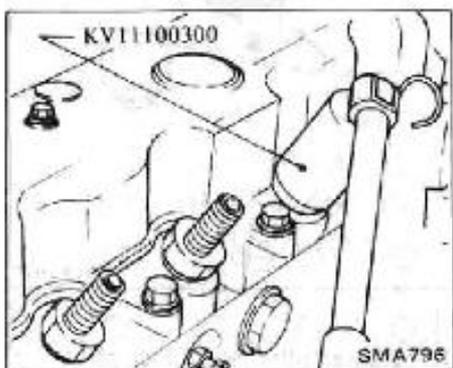
CHECKING ENGINE COMPRESSION PRESSURE

1. Warm up engine.
2. Remove following parts:
 - Injection tube on nozzle side
 - Spill tube assembly.

When removing spill tube, hold nut and nozzle to prevent it from breaking.



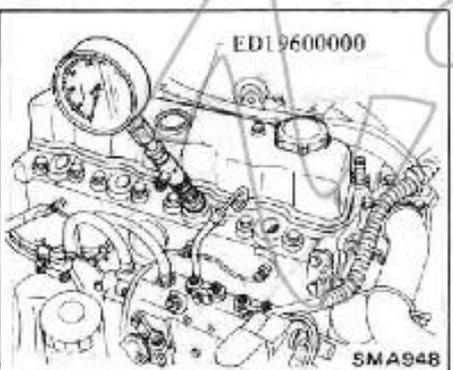
- Nozzle assemblies



- Nozzle gaskets

3. Fit compression gauge adapter to cylinder head. Make sure bleeder of gauge is closed.

- Ⓜ : Compression gauge adapter
 76 - 78 N·m
 (7.7 - 8.0 kg·m,
 56 - 58 ft·lb)

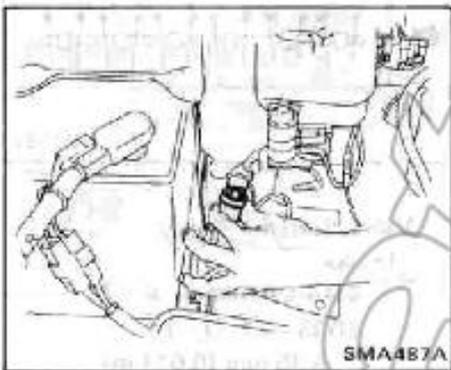


4. Set no fuel injected condition.

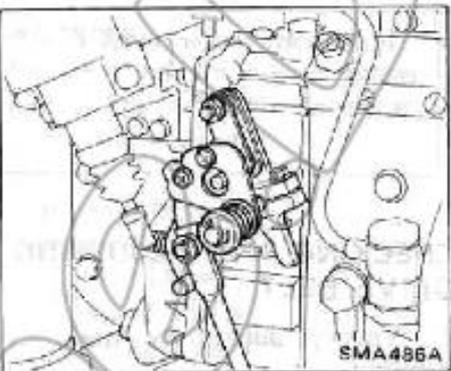
- In-line type

(1) For model equipped with injection pump controller

- a. Disconnect harness connector between injection pump control unit (D.P.C.) and injection pump controller.

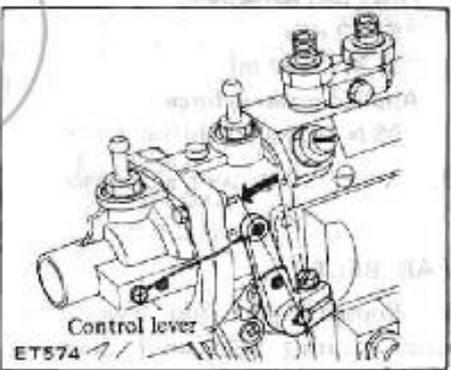


- b. Confirm that injection pump control lever stays in the stop position.

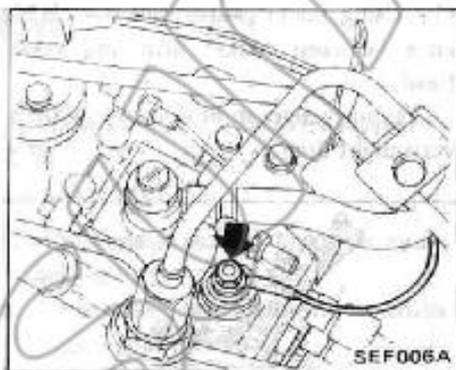


(2) For model not equipped with injection pump controller

Set control lever of injection pump at zero injection.



- VE and C.A.V.-D.P.A. type
 Disconnect or remove fuel cut solenoid wire.



5. Depress accelerator pedal fully and crank engine, then read gauge indication.

- Engine compression measurement should be made as quickly as possible.

Compression pressure:

Unit: kPa (bar, kg/cm², psi)/200 rpm

Standard	2,942 (29.4, 30, 427)
Minimum	2,452 (24.5, 25, 356)
Differential limit between cylinders	294 (2.9, 3, 43)

6. Remove compression gauge adapter and push bleeder. Make sure that bleeder is closed before attempting to check another cylinder.

If cylinder compression in one or more cylinders is low, pour a small quantity of engine oil into cylinders through the nozzle holes and retest compression.

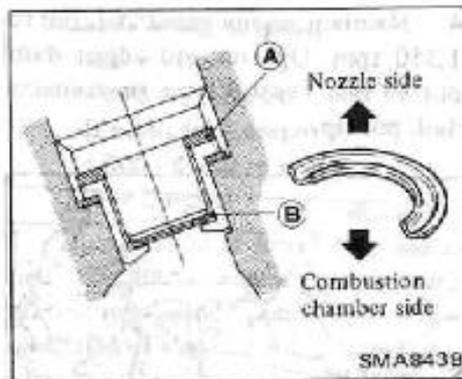
- If adding oil helps the compression pressure, chances are that piston rings are worn or damaged.
- If pressure stays low, valve may be sticking or seating improperly.
- If cylinder compression in any two adjacent cylinders is low, and if adding oil does not help the compression, there is leakage past the gasketed surface.
 Oil and water in combustion chambers can result from this problem.

7. Install following parts:

- Nozzle gaskets

When installing injection nozzle, observe the following cautions.

- Always use new injection nozzle gaskets (A and B).
- When installing the small nozzle gasket (B), the installation direction is as shown in figure at right.



- Nozzle assemblies
 - Spill tube assembly
 - Injection tube
8. Bleed air from fuel system. Refer to BLEEDING FUEL SYSTEM in section EF.

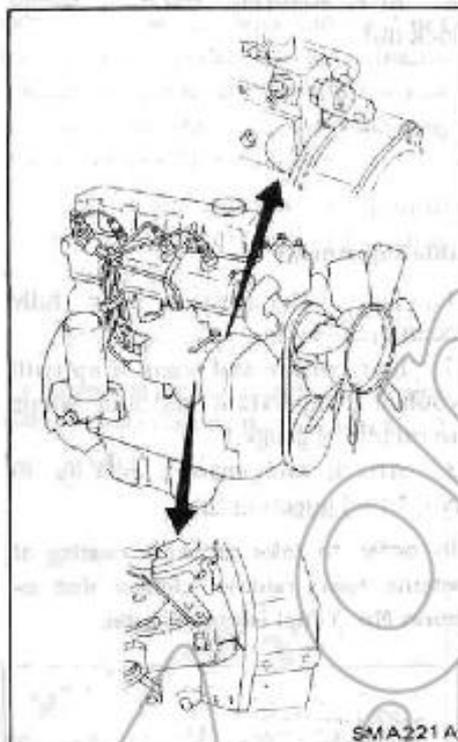
INJECTION AND FUEL SYSTEM

CHECKING AND ADJUSTING INJECTION TIMING

CHECKING

Check alignment marks on pump and engine front plate. Align these if necessary or check initial injection timing.

Refer to section EF for adjusting initial timing.



IDLE AND MAXIMUM SPEED ADJUSTMENT

IN-LINE TYPE

CAUTION:

- Do not remove sealing wires unless absolutely necessary.
- Maximum speed adjusting screw is retained by sealing wire and need not be adjusted under normal circumstances. However, if it should become necessary, adjust it with the screw. After adjustment, always wind up with sealing wire.

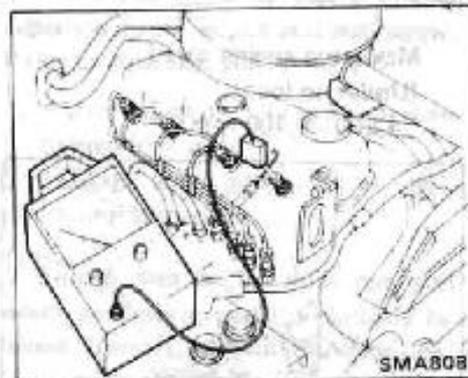
Throttle control wire adjustment

- Turn idle control knob fully counterclockwise.
 - Push idle control knob in.
- Make sure that free play is 1 mm (0.04 in) at venturi's throttle lever.
- If not within the specified range, adjust with wire adjusting nut.
- After adjusting free play properly, tighten lock nut.

Idle adjustment

- Turn idle control knob fully counterclockwise.
 - Push idle control knob in.
- Run engine until coolant temperature indicator points to the middle of gauge.
- Attach tachometer's pick-up to No.1 fuel injection tube.

In order to obtain a more accurate reading of engine speed, remove the clamps on No. 1 injection tube.



- Loosen lock nut, then adjust engine to the specified idle speed with idle speed screw.

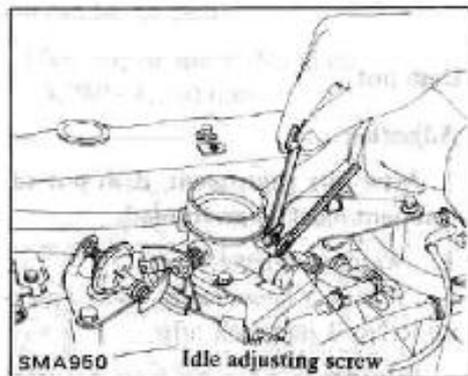
Idle speed:

550 - 650 rpm

(without power steering/
Air conditioner)

650 - 750 rpm

(with power steering/
Air conditioner)



- After adjusting idle speed, tighten lock nut.

Maximum speed adjustment

Maximum speed adjusting screw is retained by sealing wire and need not be adjusted under normal circumstances. However, if it should become necessary to adjust it, the following procedures should be followed:

1. Start engine and warm it up until coolant temperature indicator points to middle of gauge.
2. Connect tachometer's pick-up to No. 1 fuel injection tube.

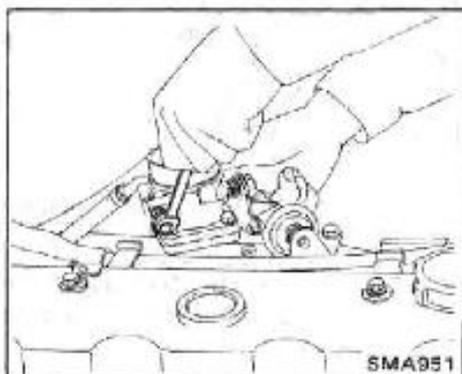
To obtain accurate reading of engine rpm, loosen clamp that secures No. 1 fuel injection tubes.

3. To obtain maximum speed, turn the adjusting screw either direction while fully depressing accelerator pedal.

Maximum engine speed

(Under no load):

4,200 - 4,400 rpm



4. After adjustment, tighten lock nut securely.
5. Wind up with a sealing wire.

Dash pot

Adjusting

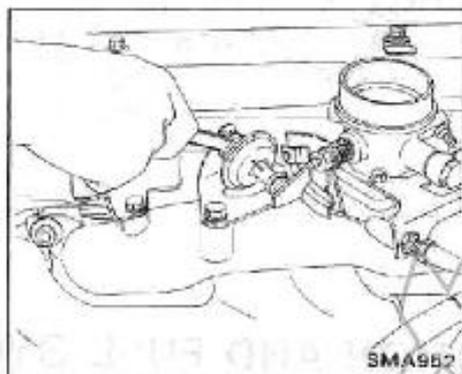
After idle adjustment, dash pot adjustment must be performed.

1. Warm up engine.
2. Attach a diesel tacho tester's pick-up to No. 1 injection tube.

In order to obtain a more accurate reading of engine speed, remove the clamp on No. 1 injection tube.

3. Loosen dash pot lock nut.

4. Maintain engine speed at 1,280 to 1,350 rpm. Operate and adjust dash pot so that control lever tip contacts dash pot tip.

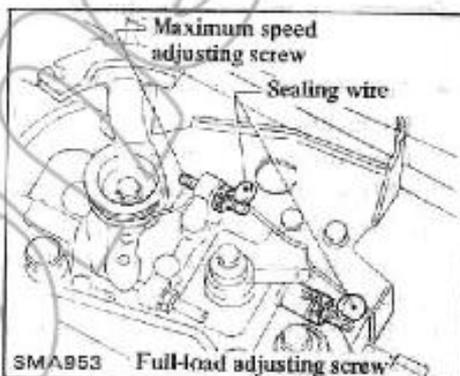


5. Tighten dash pot lock nut.

VE-TYPE

CAUTION:

- a. Do not remove sealing wires unless absolutely necessary.



- b. Disturbing full-load adjusting screw adjustment will change fuel flow characteristics, resulting in an improperly adjusted engine. Readjustment of fuel injection pump should be done using a pump tester.

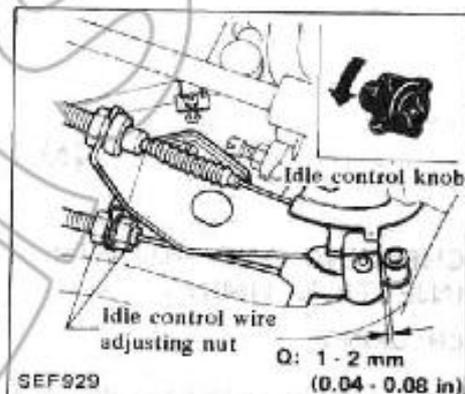
- c. If maximum speed adjusting screw is turned in direction that increases control lever angle, engine damage may result.

Throttle control wire adjustment

1. Turn idle control knob fully counterclockwise.
2. Make sure that clearance between idle control lever pin and fuel injection pump control lever is within the specified range.

Clearance:

1 - 2 mm (0.04 - 0.08 in)

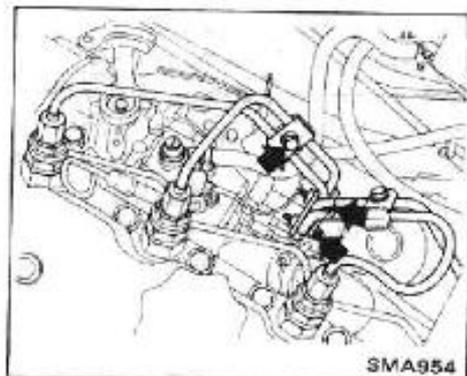


3. If not within the specified range, adjust with idle control wire adjusting nut.
4. After adjusting clearance, tighten lock nut.

Idle adjustment

1. Turn idle control knob fully counterclockwise.
2. Start engine and warm it up until coolant temperature indicator points to middle of gauge.
3. Attach tachometer's pick-up to No. 1 fuel injection tube.

In order to take accurate reading of engine rpm, remove clamps that secures No. 1 fuel injection tube.



4. Adjust engine to specified idle speed with idle speed adjusting screw.

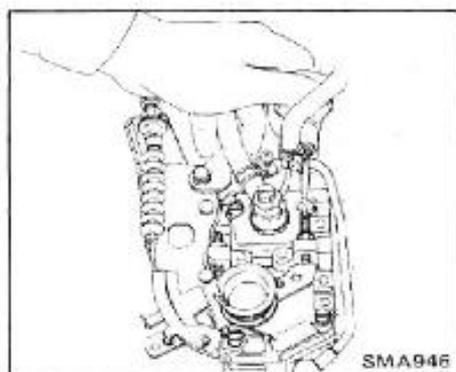
Idle speed:

550 - 650 rpm

(without power steering/
Air conditioner)

650 - 750 rpm

(with power steering/
Air conditioner)



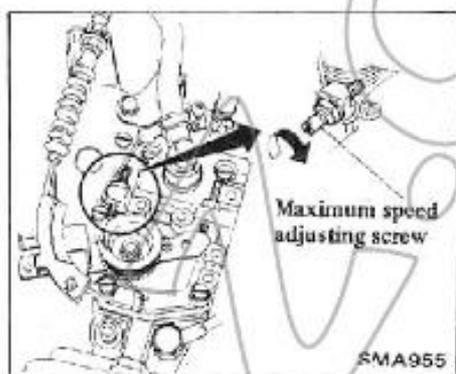
5. After adjusting idle speed properly, tighten lock nut.

Maximum speed adjustment

Maximum speed adjusting screw is retained by sealing wire and need not be adjusted under normal circumstances. However, if it should become necessary to adjust it, the following procedure should be followed:

1. Start engine and warm it up until coolant temperature indicator points to middle of gauge.
2. Connect tachometer's pick-up to No. 1 fuel injection tube.

To obtain accurate reading of engine rpm, remove clamps that secures No. 1 fuel injection tube.



3. Depress accelerator pedal fully under no load and, at this point, read the tachometer indication.

Maximum engine speed

(Under no load):

4,450 - 4,750 rpm

(Except for Europe)

4,500 - 4,700 rpm

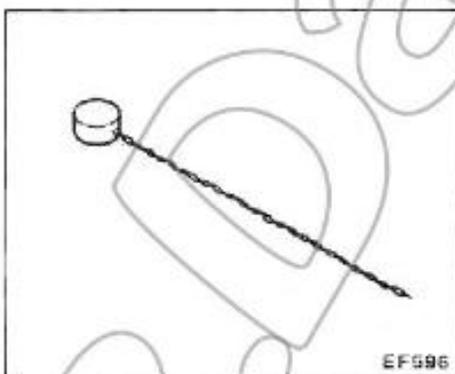
(For Europe)

4. If indication is lower than specified maximum engine speed, turn maximum speed adjusting screw counterclockwise 1 or 2 rotations. Then depress accelerator pedal to floor under no load and, at this point, read indication.

5. If indication is still lower than specified speed, repeat step 4 above until specified engine speed is reached.

6. After adjustment, tighten lock nut securely.

7. Wind up with a sealing wire.



C.A.V.-D.P.A. TYPE

CAUTION:

- a. Do not remove sealing wires unless absolutely necessary.
- b. Always adjust the engine's maximum speed so that it can not overrun. Overrunning can damage engine.

Throttle control wire adjustment

1. Turn idle control knob fully counterclockwise.
2. Make sure that free play is 1 mm (0.04 in) at pump control lever.
3. If not within the specified range, adjust with wire adjusting nuts.
4. After adjusting free play properly, tighten lock nut.

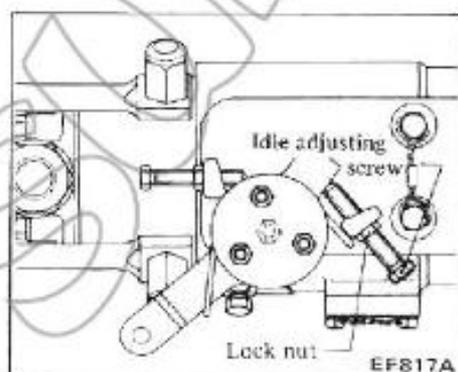
Idle adjustment

1. Run engine until coolant temperature indicator points to middle of gauge.

2. Disengage accelerator wire at injection pump throttle lever.

3. Adjust engine to the specified idle speed with idle adjusting screw.

Idle speed: 650 rpm



If engine speed does not drop to specified idle speed by means of idle adjusting screw, adjust anti-stall screw. Refer to Anti-stall Adjustment.

4. After adjusting idle speed properly, tighten lock nut.

5. Engage accelerator wire at injection pump throttle lever.

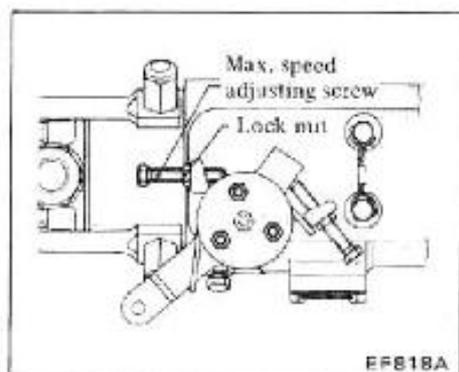
Ensure that engine does not stall when accelerator pedal is abruptly released from fully depressed position. If it stalls, make "an anti-stall adjustment".

Maximum speed adjustment

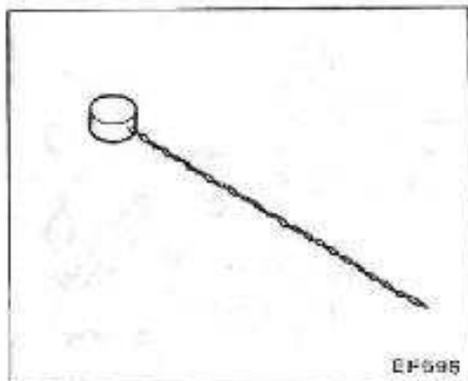
1. Disengage accelerator wire at the injection pump throttle lever.
2. Run engine under no load, and move throttle lever to fully open position. Adjust engine to specified max. rpm (under no load).

Max. engine speed (No load):

4,250 - 4,300 rpm



3. After adjustment, tighten lock nut securely.
4. Slide a sealing sleeve over max. speed adjusting screw, and wind up with a wire.

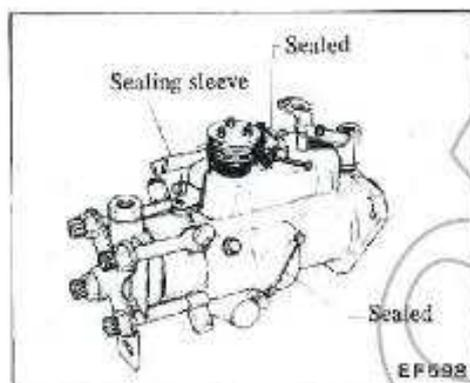


5. Engage accelerator wire at injection pump throttle lever.

Seal up at the following three places.

- (1) Max. speed adjusting screw (Nissan)
- (2) Control cover mounting bolt (Pump manufacturer)
- (3) Cover plate mounting bolt on pump housing side (Pump manufacturer)

If injection pump is renewed, have new pump adjusted for max. engine speed and sealed up by distributor.



Anti-stall adjustment

If any of the following conditions is noted, make an anti-stall adjustment.

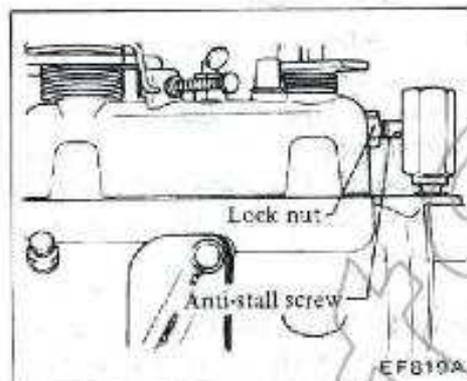
- a. Engine stalls when accelerator pedal is abruptly released from full throttle position.
- b. Engine does not drop to idle speed with idle adjusting screw.

Adjustment of condition (a)

1. Disengage accelerator wire at

injection pump throttle lever.

2. Turn anti-stall screw in until engine speed starts to increase. From that position, turn screw out one-half rotation.



3. After adjusting idle speed and engaging accelerator wire, ensure that engine does not stall.

If lock nut is left loose during adjustment, fuel may leak.

Tighten lock nut whenever fuel leakage occurs.

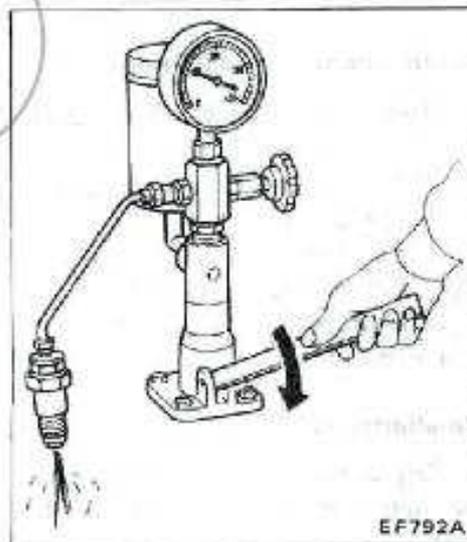
Adjustment of condition (b)

Turn anti-stall screw out, then adjust engine to specified idle speed in same manner as adjustment of condition (a).

INJECTION NOZZLE INSPECTION

Check valve for nozzle tester should be closed to prevent damage to gauge.

- a. Check initial injection pressure by pumping tester handle one time per second.



Initial injection pressure:

DIESEL KIKI

9,807 - 10,297 kPa
(98.1 - 103.0 bar,
100 - 105 kg/cm²,
1,422 - 1,493 psi)

C.A.V.-D.P.A.

12,259 - 13,239 kPa
(122.6 - 132.4 bar,
125 - 135 kg/cm²,
1,778 - 1,920 psi)

New nozzle initial injection pressure:

DIESEL KIKI

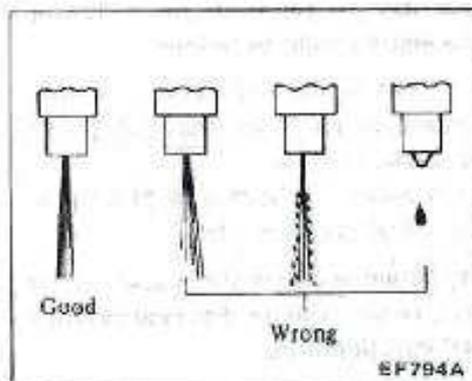
10,297 - 11,082 kPa
(103.0 - 110.8 bar,
105 - 113 kg/cm²,
1,493 - 1,607 psi)

C.A.V.-D.P.A.

13,141 - 13,730 kPa
(131.4 - 137.3 bar,
134 - 140 kg/cm²,
1,905 - 1,991 psi)

The new nozzle requires that the initial injection pressure always be checked.

- b. Check spray pattern by pumping tester handle 4 to 6 times per second or more.

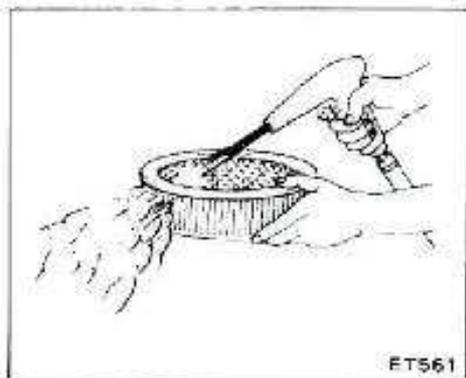


If injection starting pressure or spray pattern is not normal, adjust injection nozzle. For details, refer to INJECTION NOZZLE ASSEMBLY in EF section.

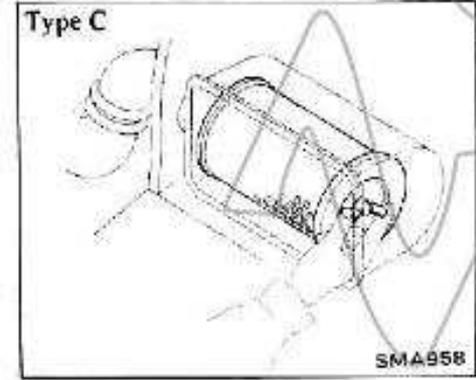
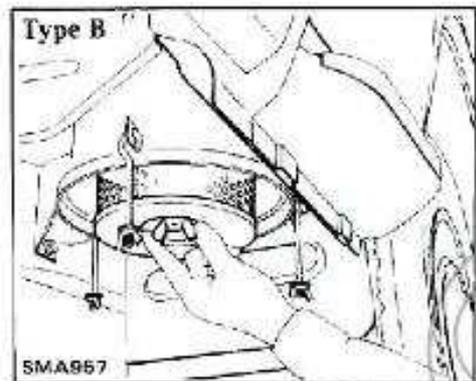
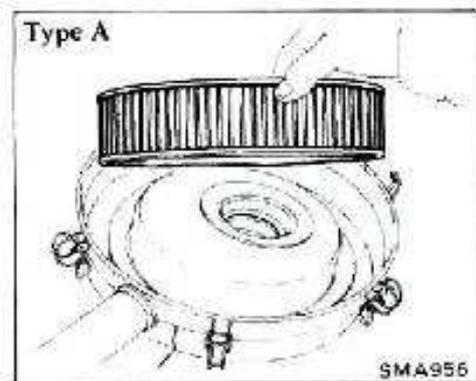
CLEANING AND REPLACING AIR CLEANER FILTER

- a. Replace viscous type filter element at the specified maintenance intervals. It does not have to be cleaned between replacement periods.

b. Clean dry type filter element at the specified maintenance intervals. If necessary, replace it.



1. Remove air cleaner cover.
2. Replace or clean air cleaner element.



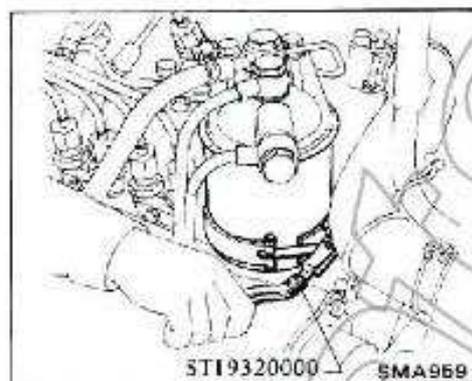
CHECKING FUEL FILTER, DRAINING WATER AND REPLACING FILTER

REPLACING FUEL FILTER

In-line type

Cartridge

1. Remove fuel filter, using Tool.



2. Install new fuel filter.

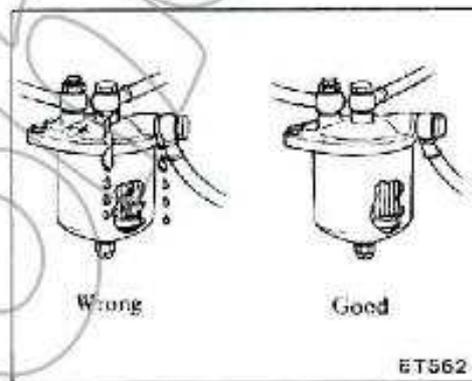
Hand-tighten only.
DO NOT use wrench to tighten filter.

3. Bleed fuel system.

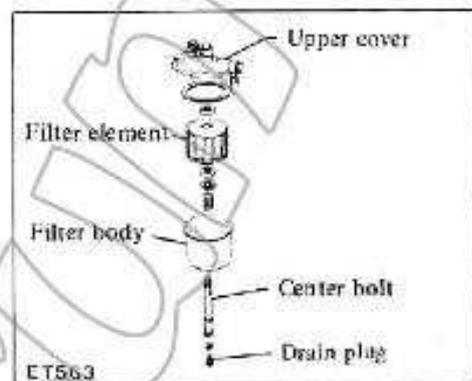
Refer to Bleeding Fuel System in EF section.

Except cartridge

1. Check fuel filter.
Check for contamination, leak or cracks.
Clean, repair or replace if necessary.



2. Drain fuel by loosening drain plug.
3. Loosen center bolt and remove bolt, filter body, element, lower cover, etc.
4. Clean component parts.
5. Install new element and assemble fuel filter.

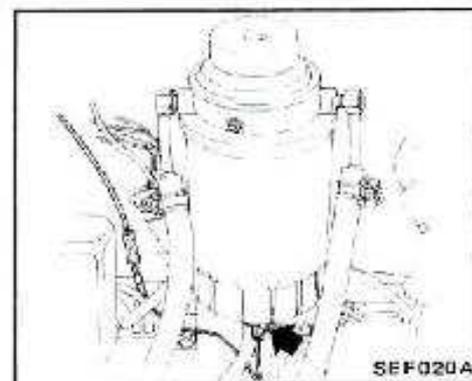


6. Bleed fuel system.

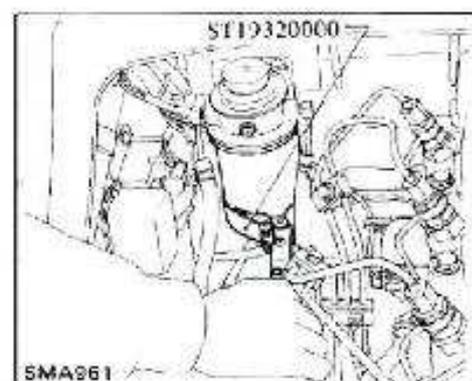
Refer to Bleeding Fuel System in EF section.

VE-type

1. Remove fuel filter sensor and drain fuel.



2. Remove fuel filter, using Tool.

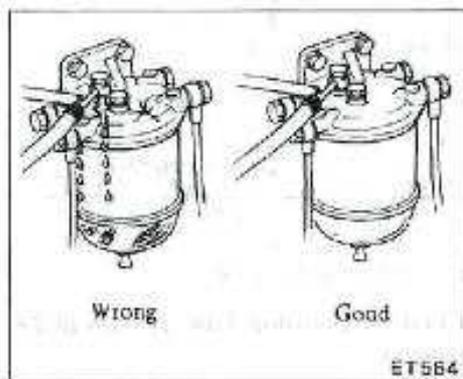


3. Install fuel filter sensor to new fuel filter.
4. Install fuel filter to priming pump.
Hand-tighten only.
DO NOT use wrench to tighten filter.
5. Bleed fuel system.
Refer to Bleeding Fuel System in EF section.

C.A.V.-D.P.A. type

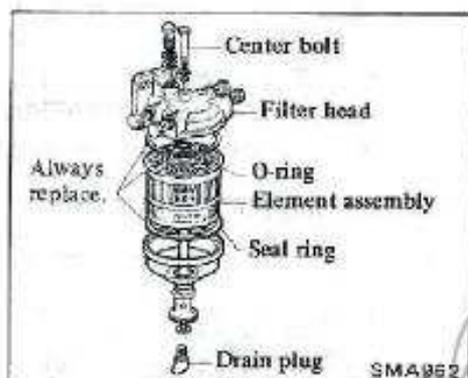
1. Check for contamination, leaks or cracks.

Clean, repair or replace if necessary.



2. Drain fuel in filter.
3. Loosen center bolt and remove stud, filter bowl, element assembly, etc.
4. Clean component parts.
5. Install new element and assemble fuel filter.

Always replace seal rings and O-ring.



6. Bleed fuel system.

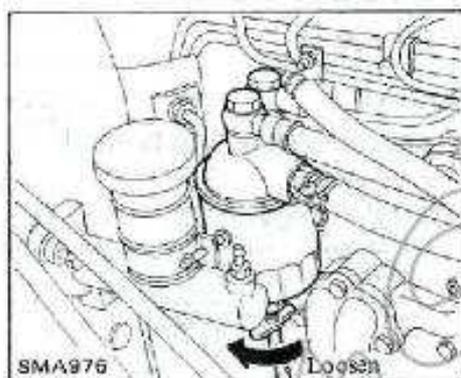
Refer to Bleeding Fuel System in EF section.

DRAINING WATER

- a. Drain water from fuel filter in accordance with maintenance schedule. Also do this when warning light comes on (for VE-type.)
- b. Bleed air from fuel system.
- c. Be sure to place a container beneath fuel filter.

In-line type

1. Loosen drain cock and drain water.



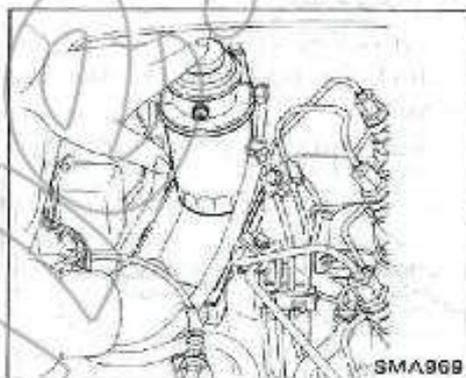
2. After draining all fuel from fuel filter, tighten drain cock.
3. Bleed fuel system.

Refer to Bleeding Fuel System in EF section.

VE-type

1. Set a container under fuel filter.
2. Remove fuel detector sensor and drain water.

Pumping priming pump will quickly drain water.

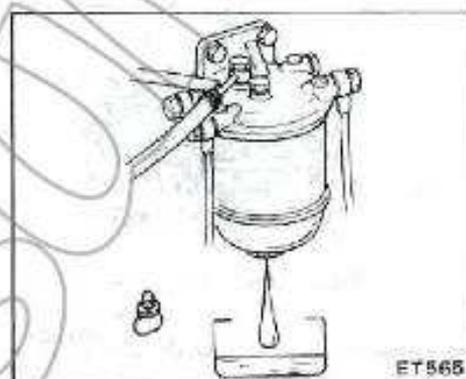


3. Install fuel detector sensor to filter.
4. Bleed fuel system.

Refer to Bleeding Fuel System in EF section.

C.A.V.-D.P.A. type

1. Remove drain plug and drain water.



2. Install drain plug to filter.
3. Bleed fuel system.

Refer to Bleeding Fuel System in EF section.

CHECKING FUEL LINES (Hoses, piping, connectors, etc.)

1. Check fuel line for leaks, particularly around fuel pipe and fuel hose connections with engine running.
2. Tighten loose connections and replace any damaged or deformed parts.

CHECKING RUBBER HOSES (Water, air vacuum and oil hoses, etc.)

1. Check injection pump governor vacuum hose and air hose, water hose and oil hose for damage, cracks or deterioration.
2. Tighten loose connections and replace any parts with cracks or deterioration.

COOLING AND LUBRICATION SYSTEM

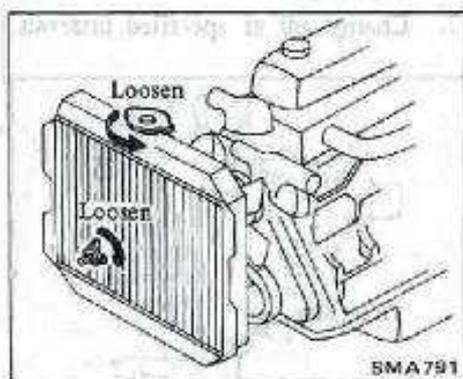
CHANGING ENGINE COOLANT

WARNING:

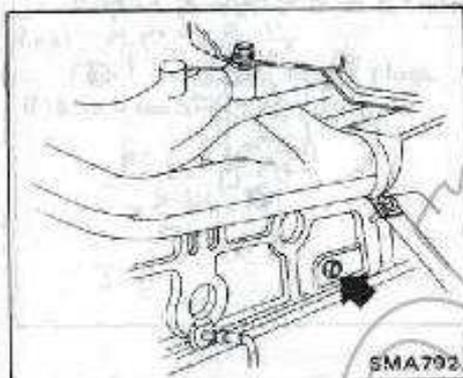
To avoid the danger of being scalded, never attempt to change the coolant when the engine is hot.

When changing engine coolant on heater equipped models, set heater "TEMP" control lever at full "HOT" position.

1. Open drain cock at bottom of radiator, and remove radiator cap.



2. Remove cylinder block drain plug.



3. Drain coolant completely. Then flush cooling system.
4. Close drain cock and plug.
5. Fill radiator with coolant up to filler opening, observing instructions attached to anti-freeze container for mixing ratio of anti-freeze to water.
6. Run engine for a few minutes. If necessary, add coolant.
7. Fill reservoir tank with coolant up to "MAX" level.
8. Install radiator cap. Check drain cock and plug for any sign of leakage.

CHECKING COOLING SYSTEM HOSES AND CONNECTIONS FOR LEAKS

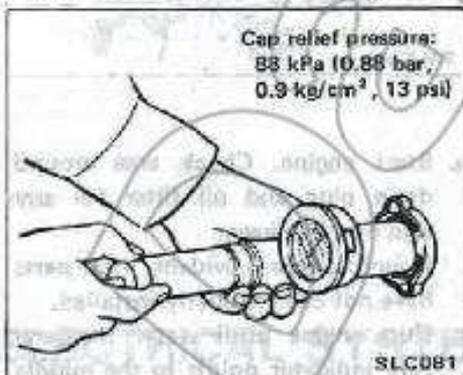
Check hoses and fittings for loose connections or deterioration.

Retighten or replace if necessary.

CHECKING RADIATOR CAP

Using cap tester, check the radiator cap relief pressure.

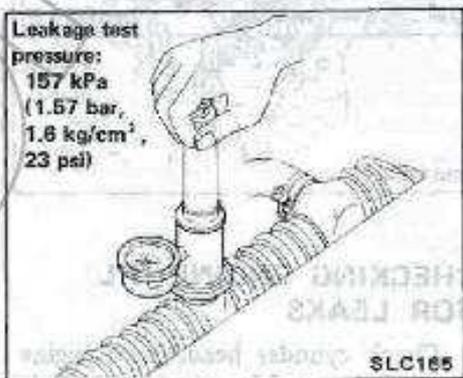
If the pressure gauge drops rapidly and excessively, replace the radiator cap.



CHECKING COOLING SYSTEM FOR LEAKS

Attach pressure tester and pump tester, and apply specified pressure. Check for drop in pressure.

If pressure drops, check for leaks from hoses, radiator, or water pump. If no external leaks are found, check heater core, block and head.

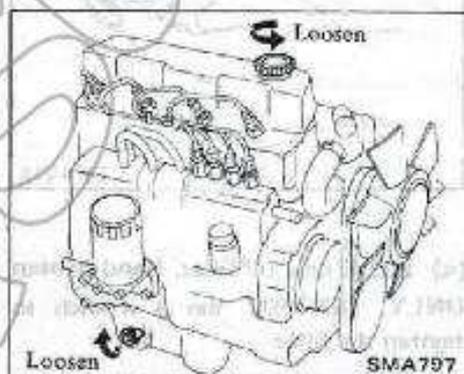


CHANGING ENGINE OIL AND OIL FILTER

1. Warm up engine.
2. Remove oil pan drain plug and oil filler cap, and allow oil to drain.

WARNING:

Be careful not to burn yourself, as the engine oil may be hot.



- A milky oil indicates the presence of cooling water. Isolate the cause and take corrective measures.
- An oil with extremely low viscosity indicates the presence of fuel.

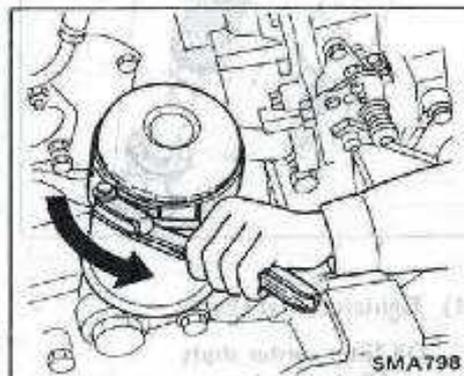
3. Clean and install oil pan drain plug with washer.

⊕ : Oil pan drain plug
49 - 59 N·m
(5 - 6 kg·m,
36 - 43 ft·lb)

4. Remove oil filter.

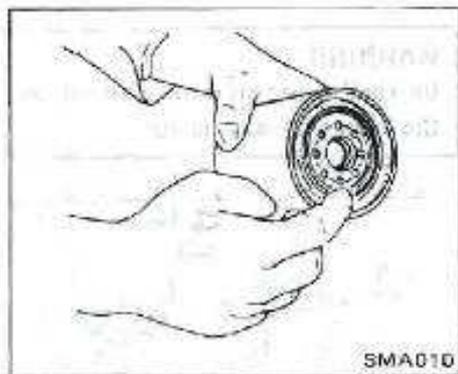
Cartridge type

- (1) Using Tool, remove oil filter.



- (2) Wipe oil filter mounting surface with a clean rag.

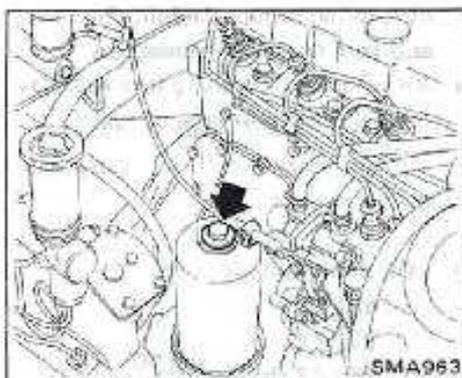
- (3) Smear a little engine oil on rubber lip of new oil filter.



- (4) Install new oil filter. Hand-tighten ONLY. DO NOT use a wrench to tighten the filter.

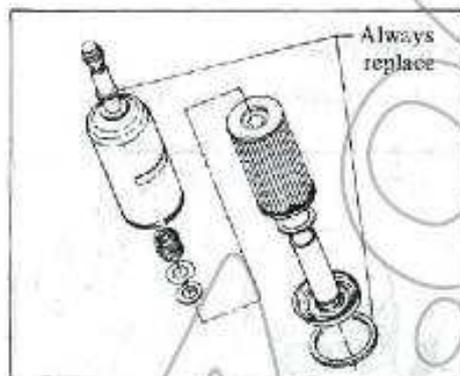
Center shaft type

- (1) Remove center shaft.



- (2) Take out filter element.
(3) Install new element

Always use new gaskets.

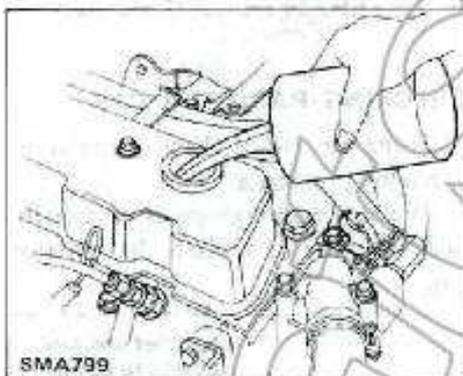


- (4) Tighten center shaft

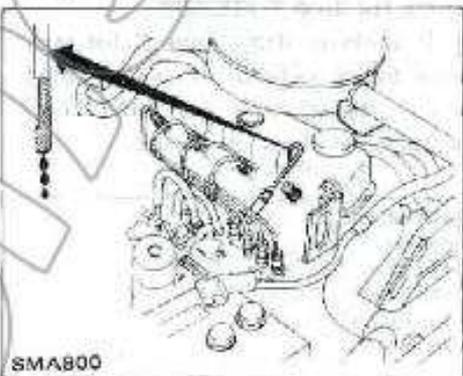
- Ⓣ : Oil filter center shaft
SD 4-cylinder
25 - 29 N-m
(2.5 - 3.0 kg-m,
18 - 22 ft-lb)

SD33
20 - 25 N-m
(2.0 - 2.5 kg-m,
14 - 18 ft-lb)

5. Refill engine with new engine oil, referring to Recommended Lubricants in Owner's Manual loaded on vehicle.



- a. Start engine. Check area around drain plug and oil filter for any sign of oil leakage. If any leakage is evident, these parts have not been properly installed.
b. Run engine until water temperature indicator points to the middle of gauge. Then stop engine and check oil level with dipstick. If necessary, add engine oil.
c. When checking oil level, park the car on a level surface.

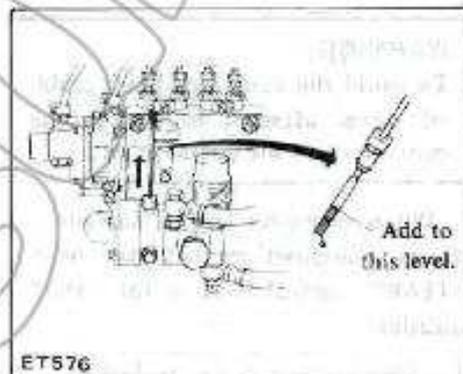


CHECKING ENGINE OIL FOR LEAKS

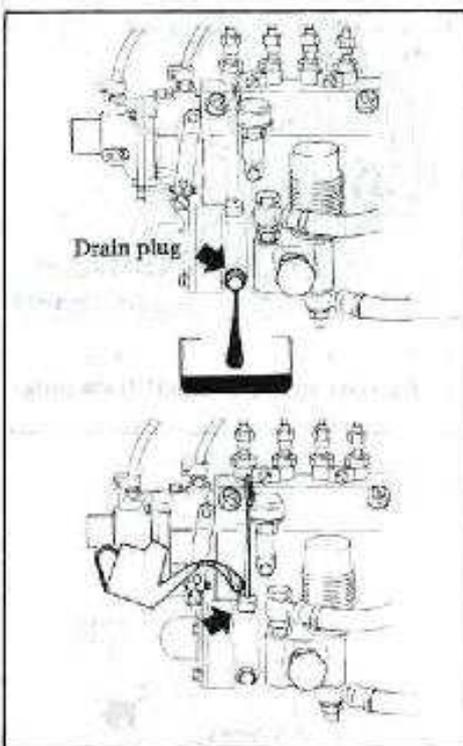
Check cylinder head, front engine cover, oil pan, oil pump, oil filter gasket, etc. or other parts for sign of leaks past their gasketed surfaces. If necessary, replace gaskets or faulty parts. After maintenance has been done, check replaced parts to see if any leaks occur.

CHECKING AND CHANGING INJECTION PUMP OIL (Lubrication type only)

1. Check oil level.



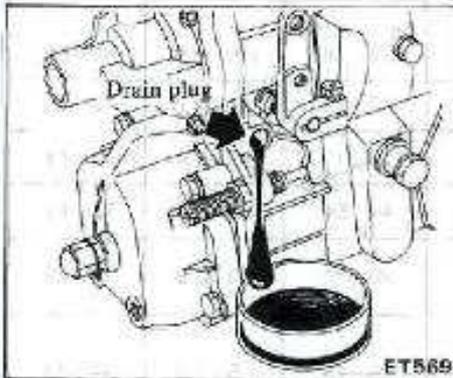
2. Change oil at specified intervals.



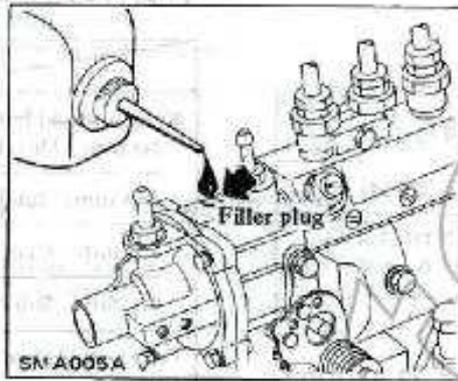
3. Check for leaks.

LUBRICATING INJECTION PUMP GOVERNOR DIAPHRAGM

1. Drain fuel from governor chamber.



2. Lubricate governor diaphragm.
Fill with three to four droplets of diaphragm oil.

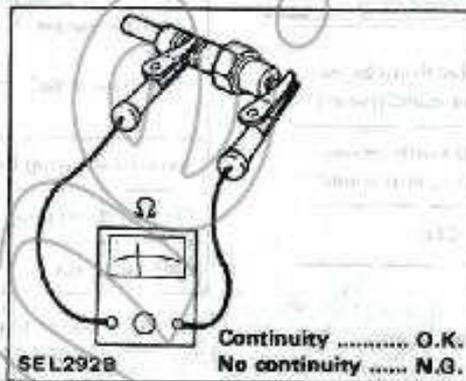


Diaphragm oil
OL36V1 or cod liver oil

ELECTRICAL SYSTEM

CHECKING GLOW PLUGS

1. Remove glow plugs from cylinder head.
2. Check continuity in glow plugs.
If there is no continuity, replace it.



SERVICE DATA AND SPECIFICATIONS

INSPECTION AND ADJUSTMENT

BASIC MECHANICAL SYSTEM

Valve clearance (Hot)	mm (in)	
Intake		0.35 (0.014)
Exhaust		0.35 (0.014)
Fan belt deflection	mm/N (kg), (in/lb)	8 - 12/98 (10), (0.31 - 0.47/22)
Compression pressure	kPa (bar, kg/cm ² , psi)/rpm	
Standard		2,942 (28.4, 30, 427)/200
Minimum		2,452 (24.5, 25, 356)/200
Compression differential limit between cylinders		294 (2.9, 3, 43)/200

INJECTION SYSTEM

Injection timing	B.T.D.C./rpm	18°/600 (Only for 720 model with SD23 or SD25)
DIESEL KIKI-Bosch in-line type		20°/600 (For the others)
VE type		8°/600
C.A.V.-D.P.A. type		14.5°/600
Idling	rpm	
In-line & VE type		550 - 650 (without power steering/air conditioner)
		650 - 750 (with power steering/air conditioner)
C.A.V.-D.P.A. type		650
Max. engine speed under no load	rpm	
In-line type		4,200 - 4,400
VE type		4,450 - 4,750 (Except for Europe)
		4,500 - 4,700 (For Europe)
C.A.V.-D.P.A. type		4,250 - 4,300
Dash pot		
Touch speed	rpm	1,200 - 1,350

COOLING SYSTEM

Unit: kPa (bar, kg/cm², psi)

Radiator cap relief pressure	88 (0.88, 0.9, 13)
Cooling system leakage testing pressure	157 (1.57, 1.6, 23)

TIGHTENING TORQUE

	N·m	kg·m	ft·lb
Cylinder head bolt			
1st turn: Main bolt	59 - 78	6.0 - 8.0	43 - 58
2nd turn: Sub bolt	20 - 29	2.0 - 3.0	14 - 22
3rd turn: Main bolt	118 - 127	12 - 13	87 - 94
4th turn: Sub bolt	44 - 54	4.5 - 5.5	33 - 40
Rocker shaft bracket bolt	20 - 25	2.0 - 2.5	14 - 18
Manifold nut Intake & exhaust	15 - 18	1.5 - 1.8	11 - 13
Injection nozzle assembly (to cylinder head)	*1 *2	6.0 - 7.0 7.0 - 8.0	43 - 51 51 - 58
Injection pump securing nut DIESEL KIKI-Bosch in-line type		2.0 - 2.5	14 - 18
VE-type			
nut	20 - 25	2.0 - 2.5	14 - 18
bolt	16 - 22	1.6 - 2.2	12 - 16
C.A.V.-D.P.A. type	15 - 20	1.5 - 2.0	11 - 14
Oil filter center shaft (Full-flow type)			
SD 4-cylinder	25 - 29	2.6 - 3.0	18 - 22
SD33	20 - 25	2.0 - 2.5	14 - 18
Venturi securing nut	3 - 4	0.3 - 0.4	2.2 - 2.9
Oil pan drain plug	49 - 59	5.0 - 6.0	36 - 43
Spill tube nut	39 - 49	4.0 - 6.0	29 - 36

*1 Part No. of injection nozzle

16600-S0060, 16600-36W00, 16600-T9000

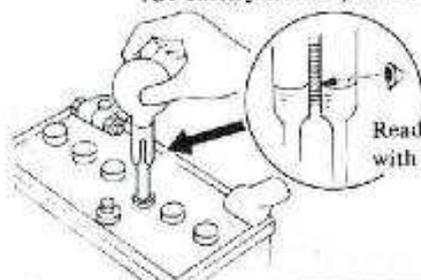
*2 Part No. of injection nozzle

16600-37502, 16600-90012, 16600-90019,
16600-J5571, 16600-T3401, 16600-T3470,
16600-T6200, 16600-T6201, 16600-Y8400,
16600-Y8401

TROUBLE DIAGNOSES AND CORRECTIONS

Engine fails or is difficult to start.

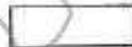
Are battery electrolyte and fuel levels O.K.?



Read top level with scale.



SMA826

-  : Condition
-  : Check points
-  : Action
-  : Probable cause system

ELECTRICAL SYSTEM

Will starter motor rotate?

Check points

- Connections
- Ignition switch
- Starting circuit
- Starter motor

O.K.

NOT O.K.

Repair or replace.

Will injection pump controller operate?

Check points

- Connections
- Check D.P.C. operations (including D.P.C. module)
- Refer to Section EL.
- Connecting rod dislocated



Ignition switch "ON" or "START" position

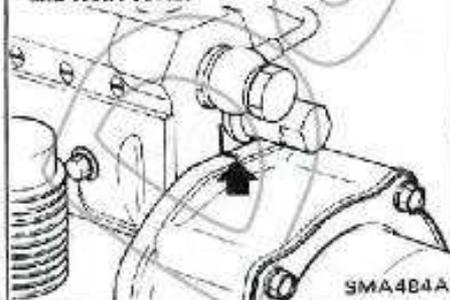
SMA827

NOT O.K.

Repair or replace.

FUEL SYSTEM

Check timing mark of injection pump and front cover.



SMA484A

O.K.

NOT O.K.

Adjust.

Crank engine to make sure fuel reaches injection nozzle.



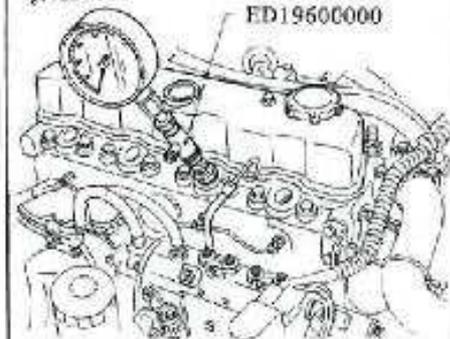
SMA828

NOT O.K.

O.K.

MECHANICAL SYSTEM

Crank engine and check compression pressure.



SMA948

Check points

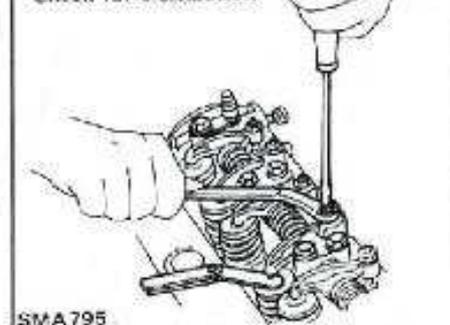
- Piston or piston ring worn
- Valve or valve seat worn
- Cylinder head gasket damaged

O.K.

NOT O.K.

Repair or replace.

Check valve clearance.



SMA795

O.K.

NOT O.K.

Adjust.

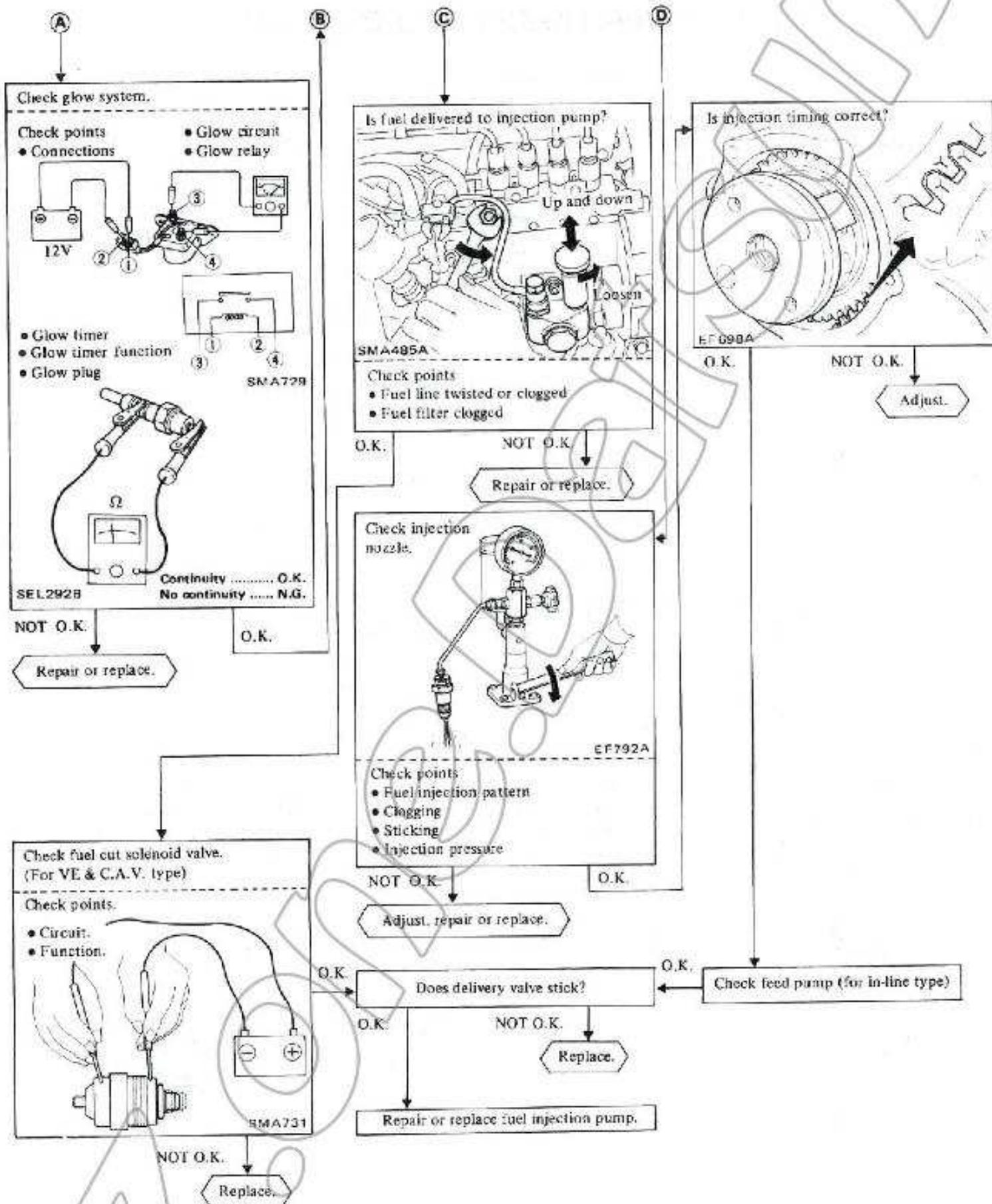
A

B

C

D

TROUBLE DIAGNOSES AND CORRECTIONS

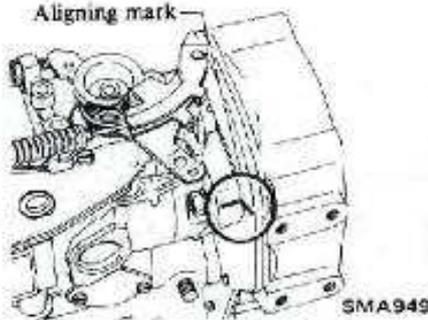


TROUBLE DIAGNOSES AND CORRECTIONS

UNSTABLE IDLING SPEED

FUEL SYSTEM

Check timing mark of injection pump and front cover.

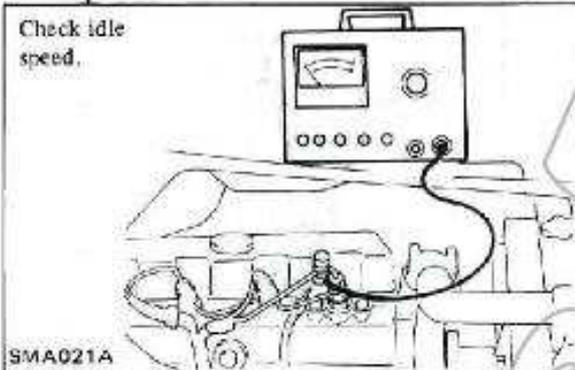


O.K.

NOT O.K.

Adjust.

Check idle speed.



O.K.

NOT O.K.

Adjust.

Check fuel line.

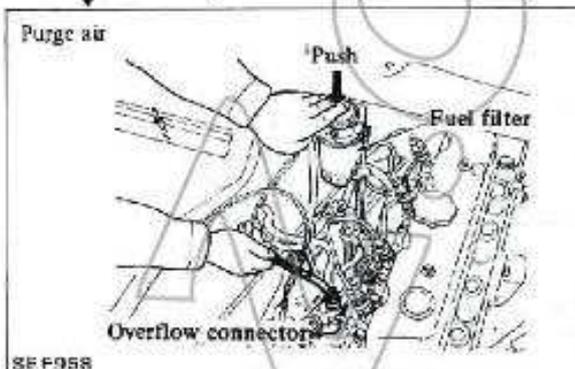
- Check points
- Fuel line twisted or clogged
 - Fuel filter clogged
 - Leaks or loose

O.K.

NOT O.K.

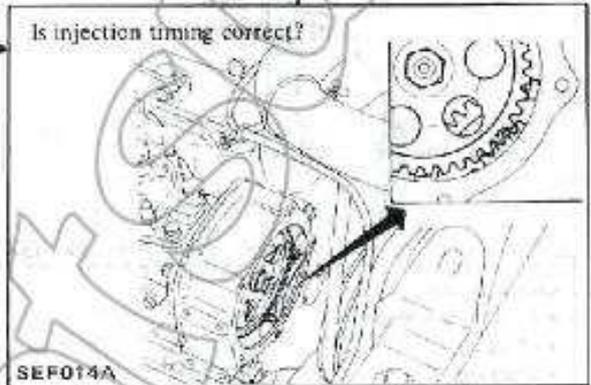
Repair, retighten or replace.

Purge air



MECHANICAL SYSTEM

Is injection timing correct?

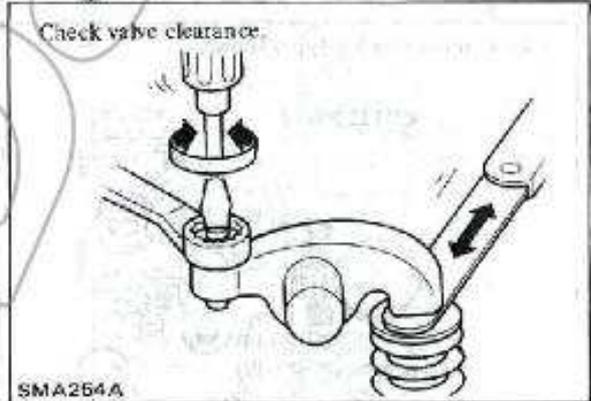


O.K.

NOT O.K.

Adjust.

Check valve clearance.



O.K.

NOT O.K.

Adjust.

Check engine mounting.

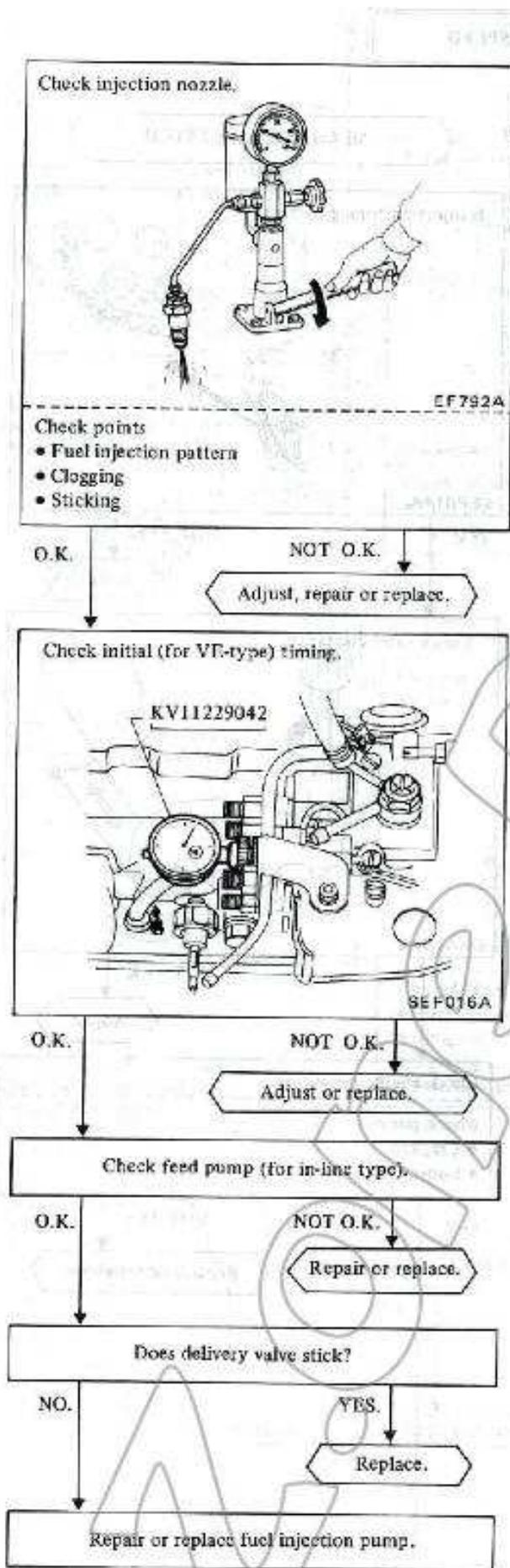
- Check points
- Cracked
 - Loose

O.K.

NOT O.K.

Replace or retighten.

A



TROUBLE DIAGNOSES AND CORRECTIONS

EXCESSIVE WHITE or BLACK SMOKE

FUEL SYSTEM

MECHANICAL SYSTEM

Check timing mark of injection pump and front cover.



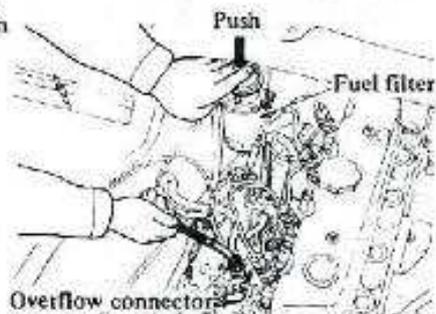
SMA848

O.K. (White smoke)

NOT O.K.

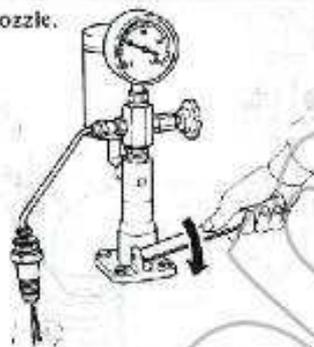
Adjust.

Purge air and drain water.



SEF958

Check injection nozzle.



EF792A

Check points

- Nozzle worn
- Spring worn
- Injection pressure

NOT O.K.

Adjust, repair or replace.

- Check initial timing.
- Check feed pump (for in-line type).
- Check operation of diesel pump controller (for in-line type).

O.K.

NOT O.K.

Adjust, repair or replace.

NOT O.K.

Check delivery valve spring for wear or breakage.

O.K.

Repair or replace fuel injection pump.

Replace.

Black smoke or white smoke?

(Black smoke)

(White smoke)

NO.

Is air cleaner element clogged?

NO.

Check for oil or similar material in or on tail pipe.

Replace.

O.K.

Normal

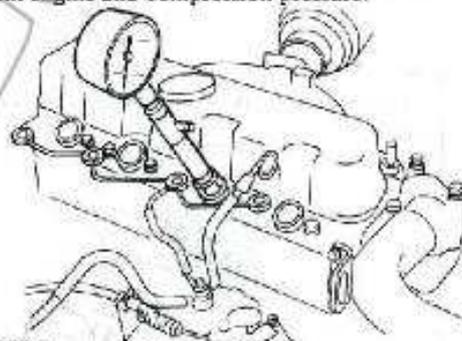
Check oil level.

YES

Decreases

Crank engine and compression pressure.

(Black smoke)



SMA822A

Check points

- Cylinder head gasket damaged
- Piston or piston ring worn
- Valve stem or valve seat worn
- Valve lip seal worn

O.K.

NOT O.K.

Repair or replace.

(Black smoke)

O.K.

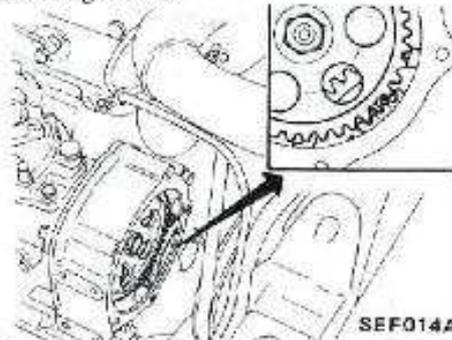
Is injection timing correct?

YES.

NO.

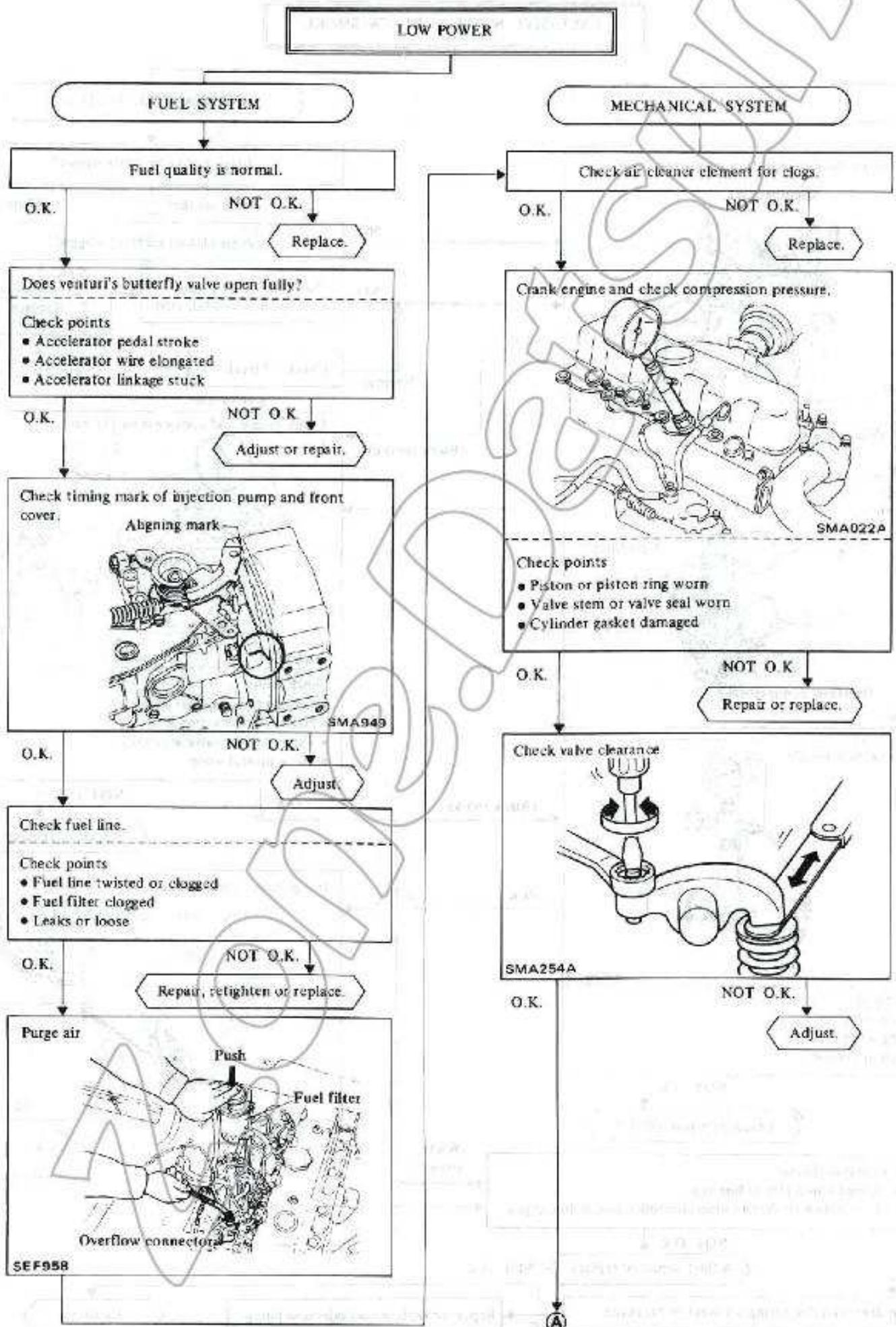
Adjust.

(White smoke)

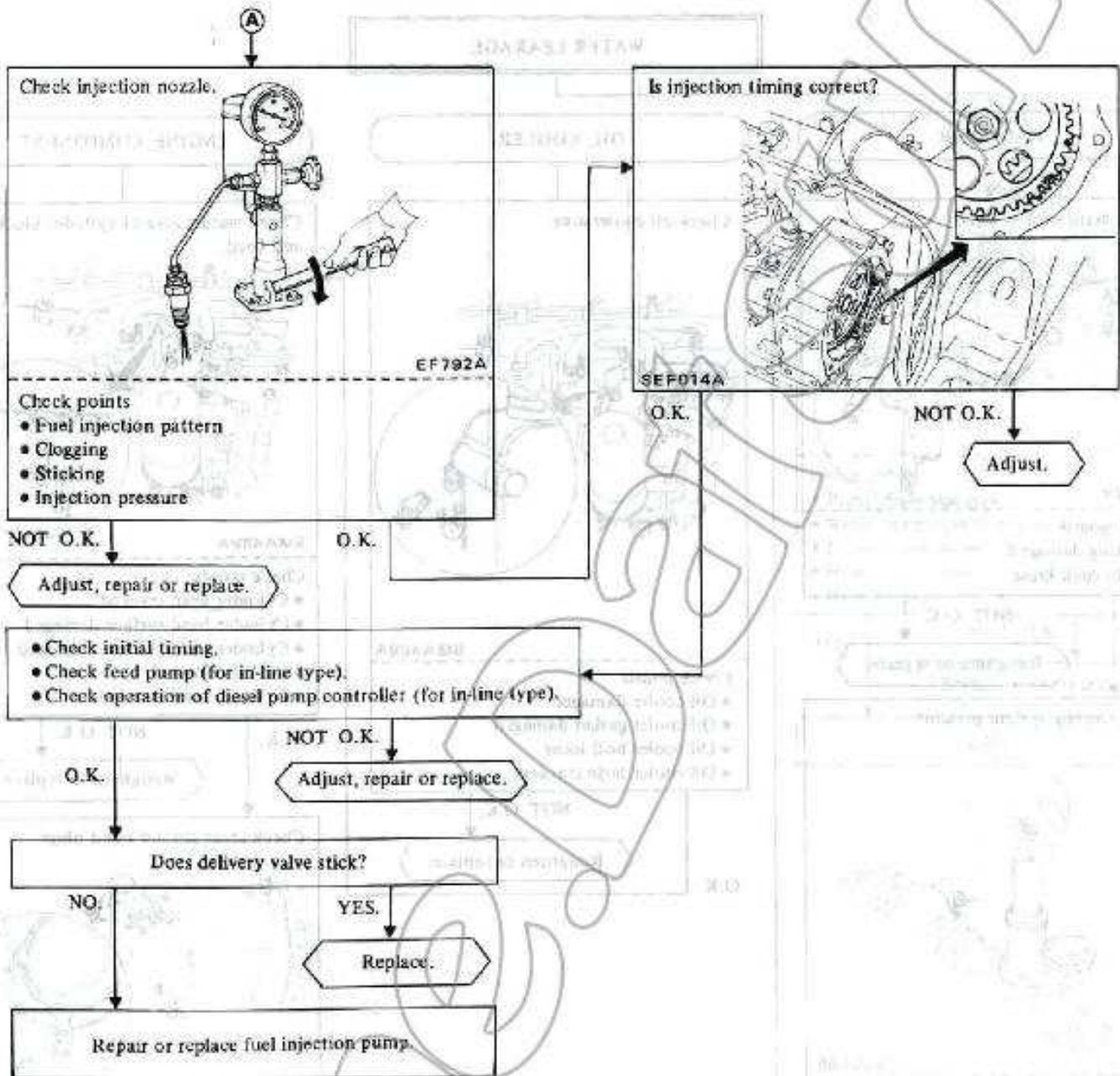


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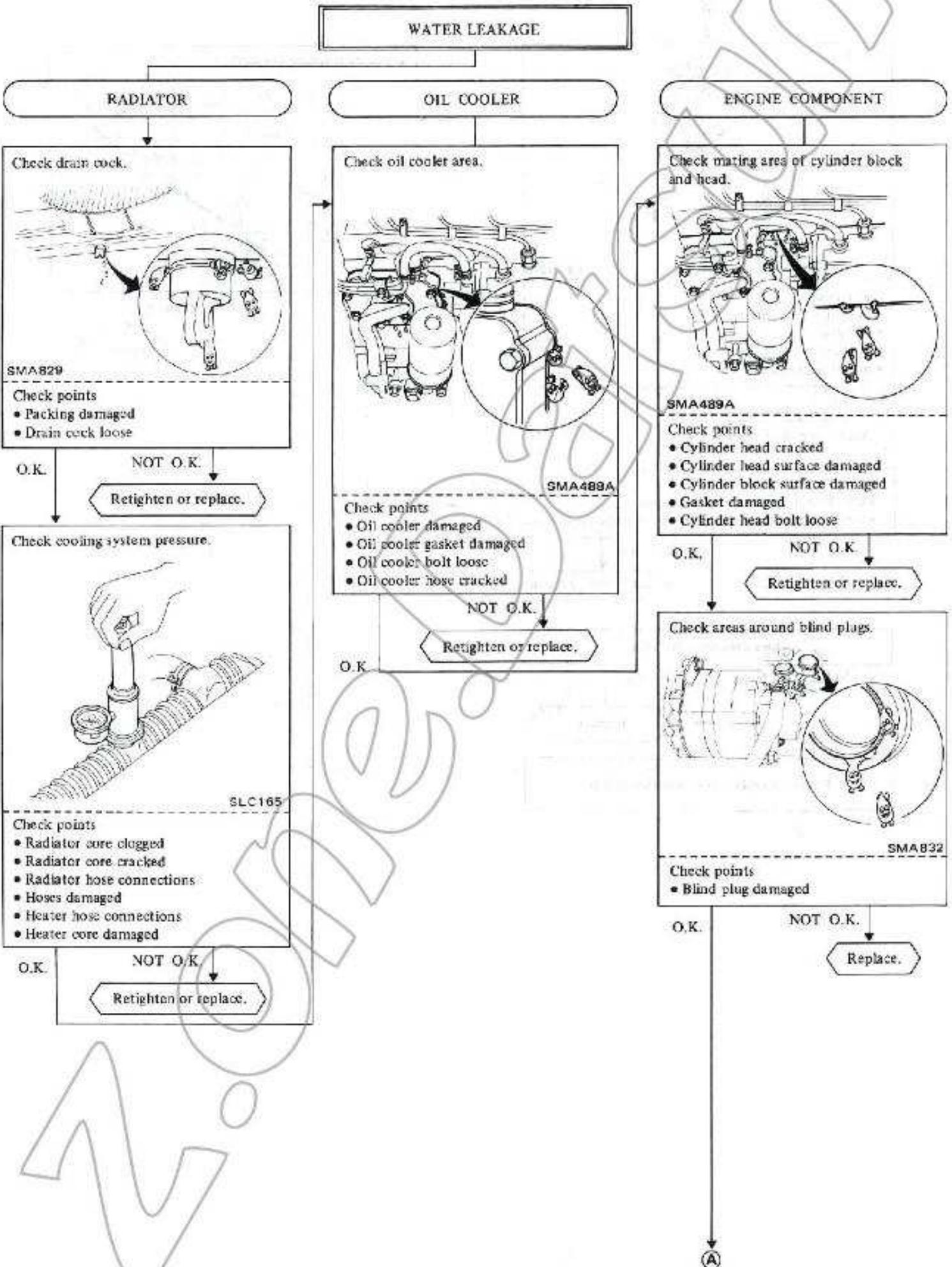
TROUBLE DIAGNOSES AND CORRECTIONS



TROUBLE DIAGNOSES AND CORRECTIONS

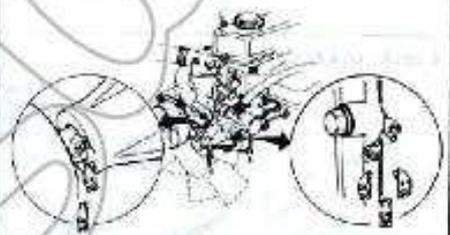


TROUBLE DIAGNOSES AND CORRECTIONS



(A)

Check around water pump.



SMA833

Check points

- Pump shaft seal leaks
- Water pump gasket damaged
- Loose connections
- Hose connections
- Hose damaged

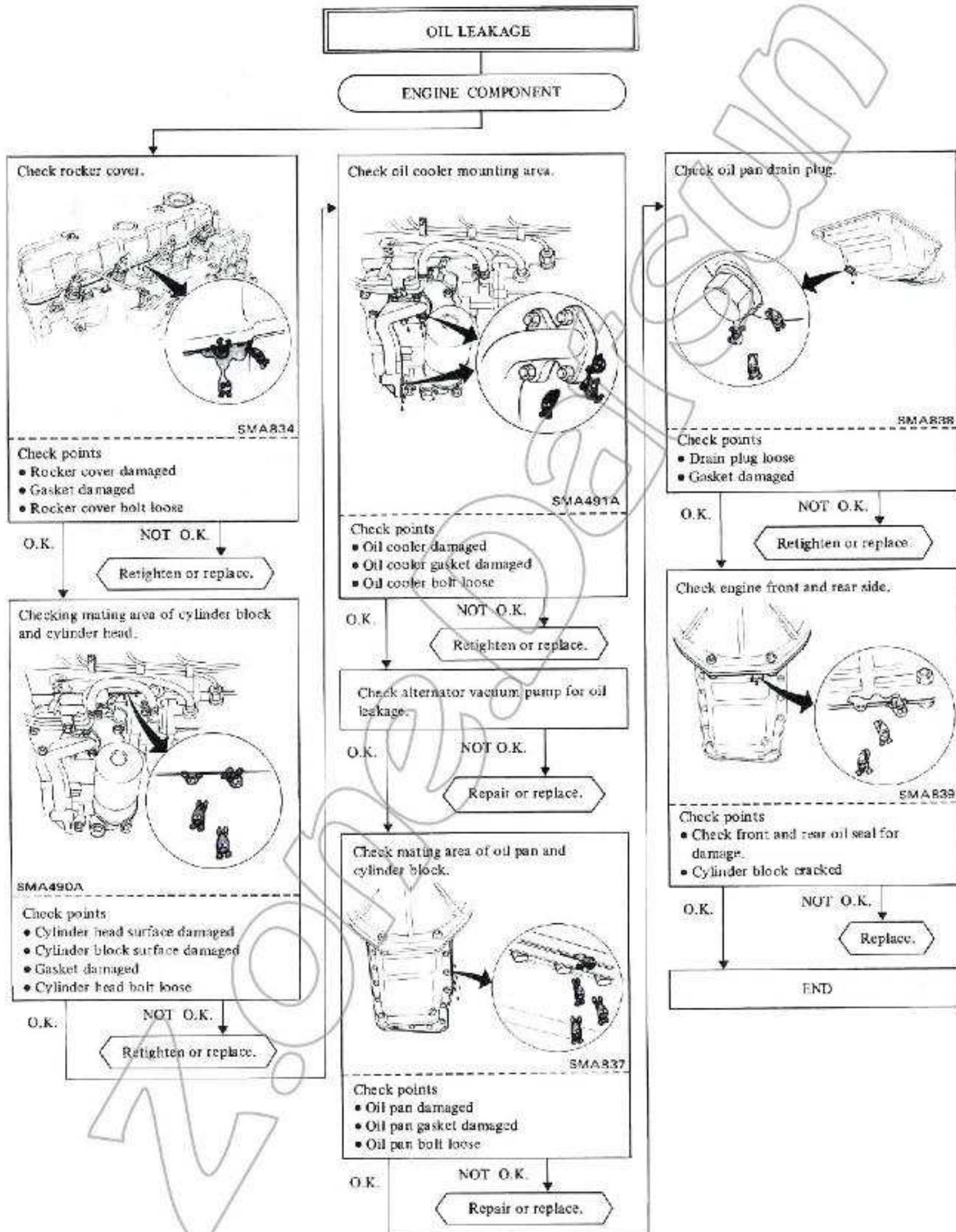
O.K.

NOT O.K.

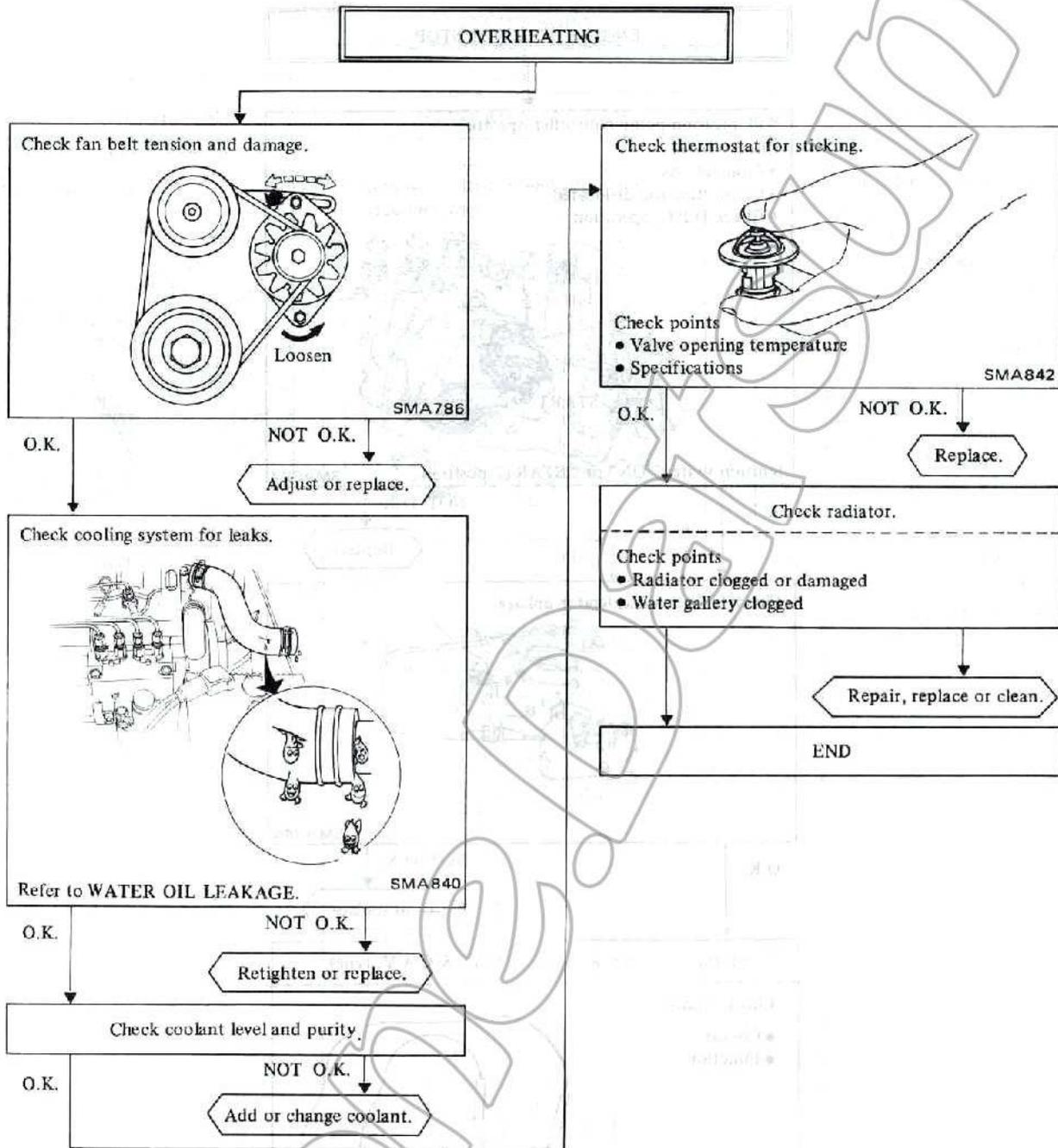
Retighten or replace.

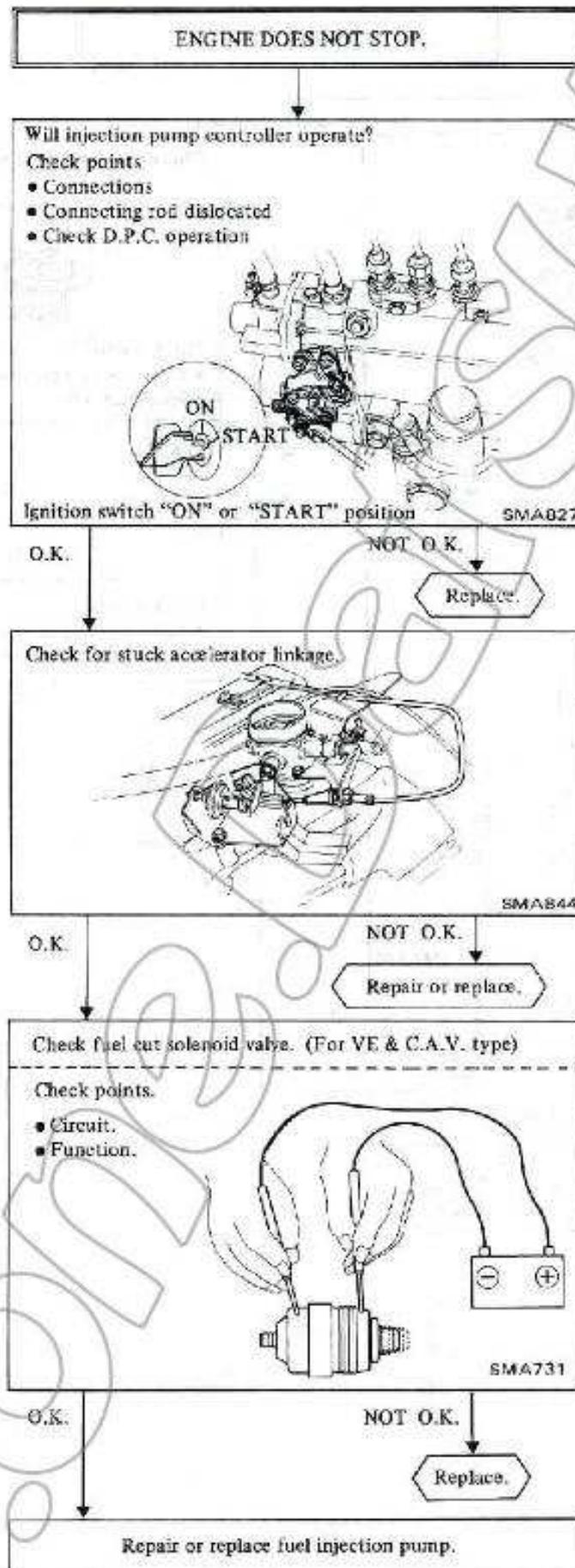
END

TROUBLE DIAGNOSES AND CORRECTIONS



TRUBLE DIAGNOSES AND CORRECTIONS

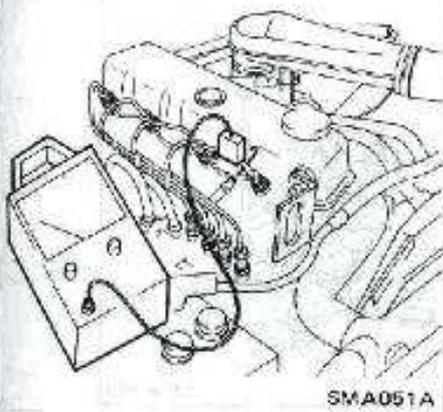




ENGINE NOISY

MECHANICAL SYSTEM

Check engine idle speed.



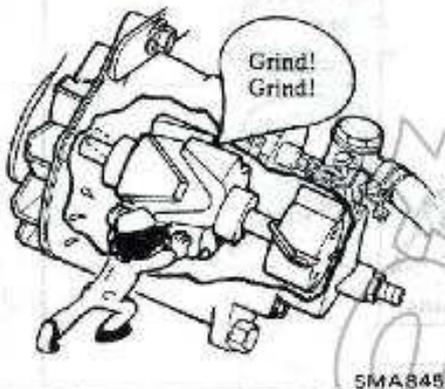
O.K.

NOT O.K.

Adjust.

ELECTRICAL SYSTEM

Is noise emitted around alternator or vacuum pump?



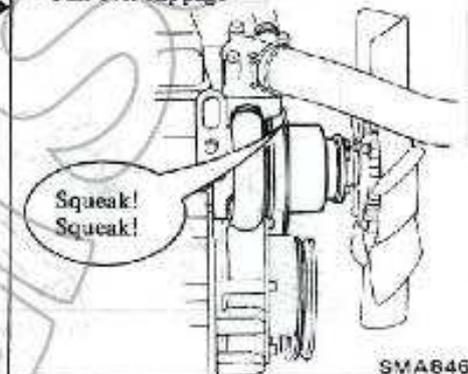
NO.

YES.

Overhaul and repair or replace.

COOLING SYSTEM

Is noise emitted around water pump?
Check points
• Fan belt slippage



NO.

YES.

Repair or replace.

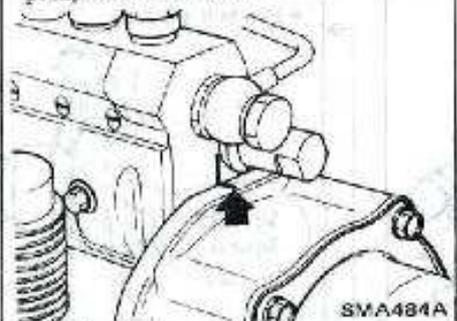
A

B

C

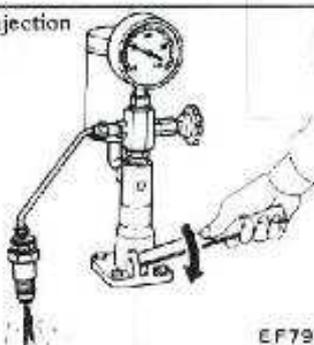
FUEL SYSTEM

Check timing mark of injection pump and front cover.



O.K. NOT O.K. Adjust.

Check injection nozzle.

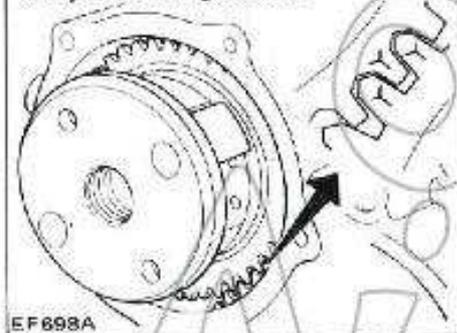


Check points

- Fuel injection pattern
- Clogging
- Sticking
- Injection pressure

O.K. NOT O.K. Clean or replace.

Is injection timing correct?

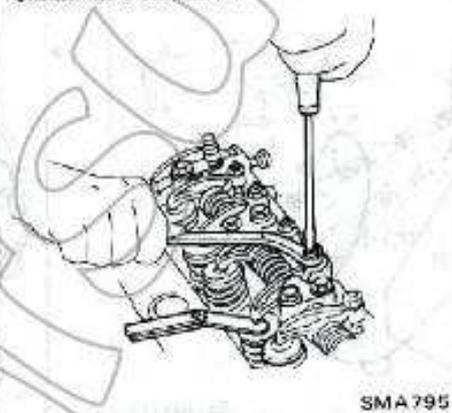


O.K. NOT O.K. Adjust.

Overhaul engine check points

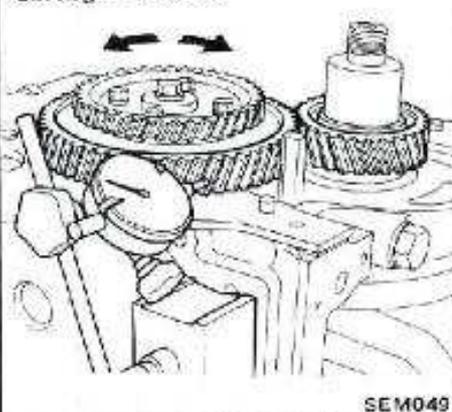
- Main bearing worn
- Connecting rod bent
- Crankshaft bent
- Tappet worn

Check valve clearance.



O.K. NOT O.K. Adjust.

Check gear backlash.



O.K. NOT O.K. Repair.

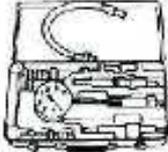
Run engine to determine whether noise is still emitted.



NO. YES.

END

SPECIAL SERVICE TOOLS

Tool number	Tool name
ED1960000	Compression gauge set 
ST19320000	Oil filter wrench 
KV11100300	Nozzle holder socket 
KV11100400	Socket 